Chapter 3
Affected Environment

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CHAPTER 3
AFFECTED ENVIRONMENT

The affected environment is the baseline from which to identify and evaluate environmental changes resulting from the proposed action and alternatives. This chapter focuses on the human environment that has the potential to be affected by implementing the land sale and land use actions. The human environment potentially affected is interpreted comprehensively to include the natural and physical resources and the relationship of people with those resources [40 Code of Federal Regulations (CFR) §1508.14]. The affected environment discussed in this chapter includes air quality, earth resources, water resources, biological resources, cultural and historical resources, Native American concerns, visual resources, land use, recreation and wilderness resources, range resources, hazardous materials, social and economic conditions, and environmental justice issues.

The approach to defining the baseline was first to identify potential issues and concerns of the land sale action. The region of influence potentially affected by these concerns is primarily the Las Vegas Valley and more specifically the disposal boundary area defined by the Southern Nevada Public Land Management Act of 1998 (SNPLMA), as amended by the Clark County Conservation of Public Land and Natural Resources Act of 2002 (Clark County Act). From this information, relevant environmental and economic conditions were identified and described using geographic information systems (GIS) data, literature searches, electronic searches, and detailed field surveys. Most of the resource information presented was taken from the Proposed Las Vegas Resource Management Plan (RMP) and Final Environmental Impact Statement (EIS) completed by the Bureau of Land Management (BLM) Las Vegas Field Office in May 1998, except when more up-to-date and accurate information was available. The data obtained during field surveys describe the existing conditions observed at the time the surveys were conducted.

Field surveys were conducted from September 2003 through April 2004 on over 47,000 acres of BLM lands within the disposal boundary area. The purpose of the surveys was to identify the presence of sensitive environmental resources and to locate potential hazardous materials sites. Biological field surveys covered the desert tortoise and sensitive plant species including the Las Vegas bearpoppy, Las Vegas buckwheat, and penstemon. Surveys were also completed to locate historic sites, archaeological sites, and paleontological resources, and to identify lands with potential hazardous materials present.

3.1 AIR QUALITY

Air resources are characterized by the existing concentrations of various pollutants and the climatic and meteorological conditions that influence the quality of the air. Precipitation, wind direction and speed (horizontal flow), and atmospheric stability (vertical flow) are factors that determine the extent of pollutant dispersion.

3.1.1 Climate and Meteorological Conditions

The Las Vegas Valley is located in the southwestern desert region of Nevada and the northeastern portion of the Mojave Desert. Climate in the Mojave Desert is usually characterized by high temperatures and low precipitation throughout the year. Temperatures usually exceed 100 degrees with lows in the 70s during the summer months. The summer heat is accompanied by extremely low relative humidity. Winters are typically characterized by mild conditions with afternoon temperatures averaging near 60 degrees and skies are mostly clear.

The Las Vegas Valley is protected from large weather systems by the surrounding mountains. Little precipitation reaches the Valley, with monthly average precipitation ranging from 0.08 inches in June to 0.53 inches in February. Average annual precipitation for the area is 4.17 inches. During a couple of weeks during the summer warm moist air predominates the area and

causes scattered thunderstorms, occasionally quite severe. Snow rarely falls in the Las Vegas Valley.

Average annual wind speed is about 9.3 miles per hour (mph). The wind is predominantly from the southwest, except that west-southwesterly and westerly winds dominate from October to January. Winter and spring wind events blanket widespread areas with blowing dust and sand. Strong-wind episodes in summer are usually associated with thunderstorms that are more isolated and localized.

3.1.2 Air Quality Measurement

The Environmental Protection Agency (EPA) established the National Ambient Air Quality Standards (NAAQS) for criteria pollutants. Criteria pollutants, listed under Section 108 of the Clean Air Act (CAA), are those compounds that cause or contribute to air pollution which could endanger public health and the environment. These pollutants may directly or indirectly originate from diverse mobile and stationary sources. The criteria pollutants include carbon monoxide (CO), nitrogen dioxide, (NO_2), sulfur dioxide (SO_2), lead (Pb), ozone (O_3), particulate matter less than 10 microns in diameters (PM_{10}), and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). While O_3 is a regulated pollutant, it is not emitted directly from sources, but is formed by a combination of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) reacting with sunlight in the atmosphere.

Air quality is determined by comparing ambient air levels with the appropriate primary of secondary NAAQS for each criteria pollutant. The primary standards establish the level of air quality necessary to protect the public health from any known or anticipated adverse effects of a pollutant, allowing a margin of safety to protect sensitive members of the population. The secondary standards establish the level of air quality necessary to protect the public welfare by preventing injury to agricultural crops and livestock, deterioration of materials and property, and adverse impact on the environment, including visibility. The State of Nevada and Clark County Department of Air Quality Management (DAQEM) have established primary standards for ambient air quality that compare to the NAAQS. The national primary, secondary, Nevada, and Clark County air quality standards for the criteria pollutants are listed in Table 3.1-1.

The air quality of a region is based on the amount of pollutants emitted and climatic and geographic conditions that affect the formation and dispersion of pollutants. Clark County is divided into 13 "airsheds" that are roughly defined on hydrographic basins determined by the State Engineer's Office (DAQM 2001).

The disposal boundary area is located in the Las Vegas (Hydrographic Basin 212) airshed with smaller portions located in the Black Mountain (Hydrographic Basin 215) airshed, as shown in Figure 3.1-1.

Areas (airsheds) not meeting ambient air quality standards are designated as non-attainment for the specific pollutant that is a violation of the standard. Non-attainment areas are further classified based on the seriousness of the violation. The Las Vegas airshed was designated as serious non-attainment for PM_{10} in 1993, serious non-attainment for CO in 1997, and non-attainment for O_3 in 2004. The Black Mountain airshed is designated in attainment or unclassified for all criteria pollutants. An area designated as unclassified is assumed to be in attainment.

3.1.3 Criteria Pollutants

This section provides a description of each criteria pollutant with information on air quality data for each pollutant. Air quality data is collected at monitoring stations throughout the Las Vegas Valley. Monitoring locations for CO, PM_{10}, and O_3 are shown in Figure 3.1-2.

3.1.3.1 Particulate Matter

Particulate matter in the atmosphere is produced from a variety of sources. Naturally-occurring soil material may be mobilized and transported by surface winds, especially when disturbed by surface activities. Motor vehicles produce small particles during their operation due to wear of tires and brake linings. Elemental carbon (soot),

TABLE 3.1-1
AMBIENT AIR QUALITY STANDARDS

Pollutant	Standard	Standard Value*	Standard Type
Ozone	8-hour	0.085 ppm	Primary, Secondary
	1-hour	0.12 ppm (235 μg/m^3)	Primary, Secondary, Nevada, Clark County
CO	8-hour	9 ppm (10,000 μg/m^3)	Primary, Nevada, Clark County
	1-hour	35 ppm (40,000 μg/m^3)	Primary, Nevada, Clark County
NO_2	Annual Arithmetic Mean	0.053 ppm (100 μg/m^3)	Primary, Secondary, Nevada, Clark County
SO_2	Annual Arithmetic Mean	0.03 ppm (80 μg/m^3)	Primary, Nevada, Clark County
	24-hour	0.14 ppm (365 μg/m^3)	Primary, Nevada
	3-hour	0.5 ppm (1,300 μg/m^3)	Secondary, Nevada, Clark County
PM_{10}	Annual Arithmetic Mean	50 μg/m^3	Primary, Secondary, Nevada, Clark County
	24-hour	150 μg/m^3	Primary, Secondary, Nevada, Clark County
$PM_{2.5}$	Annual Arithmetic Mean	15 μg/m^3	Primary, Secondary, Clark County
	24-hour	65 μg/m^3	Primary, Secondary, Clark County
Pb	Quarterly Average	1.5 μg/m^3	Primary, Secondary, Nevada, Clark County

* Parenthetical value is an approximate equivalent concentration.
Source: EPA 2004

organic material, nitrates, and sulfates are also significant components in coarse and fine PM in the Las Vegas Valley but the largest sources of particulate matter are from construction activities, vacant lands, and paved and unpaved roads. The PM_{10} is considered the size fraction of interest in air pollution studies because particles of this size are not removed by the natural filtering mechanisms of the nasal passages and sinuses. Because PM_{10} can be inhaled into the lungs it may cause health problems. The EPA has also determined that $PM_{2.5}$ may be inhaled more deeply into the lungs, causing additional health problems. This finer fraction of PM may also contribute to haze and visibility problems.

Monitoring for PM_{10} is conducted by the DAQEM as part of the National Air Monitoring Stations/State and Local Air Monitoring Stations Program. The latest available air quality monitoring data for Clark County is from 2002 (DAQM 2003). The number of exceedances per year for PM_{10} shown in Figure 3.1-3 indicates an increase in 2002 following overall declines from 1996 to 2001. The 24-hour NAAQS was exceeded a total of 11 days in 2002. The annual average concentrations for PM_{10} at the high-volume monitoring site that is used to evaluate overall air quality in the region are shown in Figure 3.1-4. The NAAQS was exceeded in 2002, representing the first exceedance of the annual average standard for Las Vegas since 1997.

Emissions inventories prepared by Clark County for the PM_{10} SIP provide a summary of point, area, stationary, and mobile sources of particulate matter that contribute to air quality problems in the Las Vegas Valley. The inventory estimated annual emissions of PM_{10} at just over 333,000 tons, with nearly two-thirds of these emissions generated from disturbed vacant lands, unpaved parking lots, and fugitive dust from native desert areas. Most of the remaining emissions originate from construction activities and on-road mobile sources. Stationary point sources such as sand and gravel operations and other industrial sites contribute less than one percent of total PM_{10} emissions (DAQM 2001).

Data from 2002 indicate that 24-hour $PM_{2.5}$ values did not exceed 50 micrograms per cubic meter (μg/m^3) with the highest annual average value measured at 11.8 μg/m^3. The lower concentrations of $PM_{2.5}$ are attributed to the fact that it is a subset of PM_{10}, and the emission sources of fine particulates in the Las Vegas Valley contribute less particulate matter to the air than sources of coarser fractions from disturbed lands, construction sites, and unpaved parking lots.

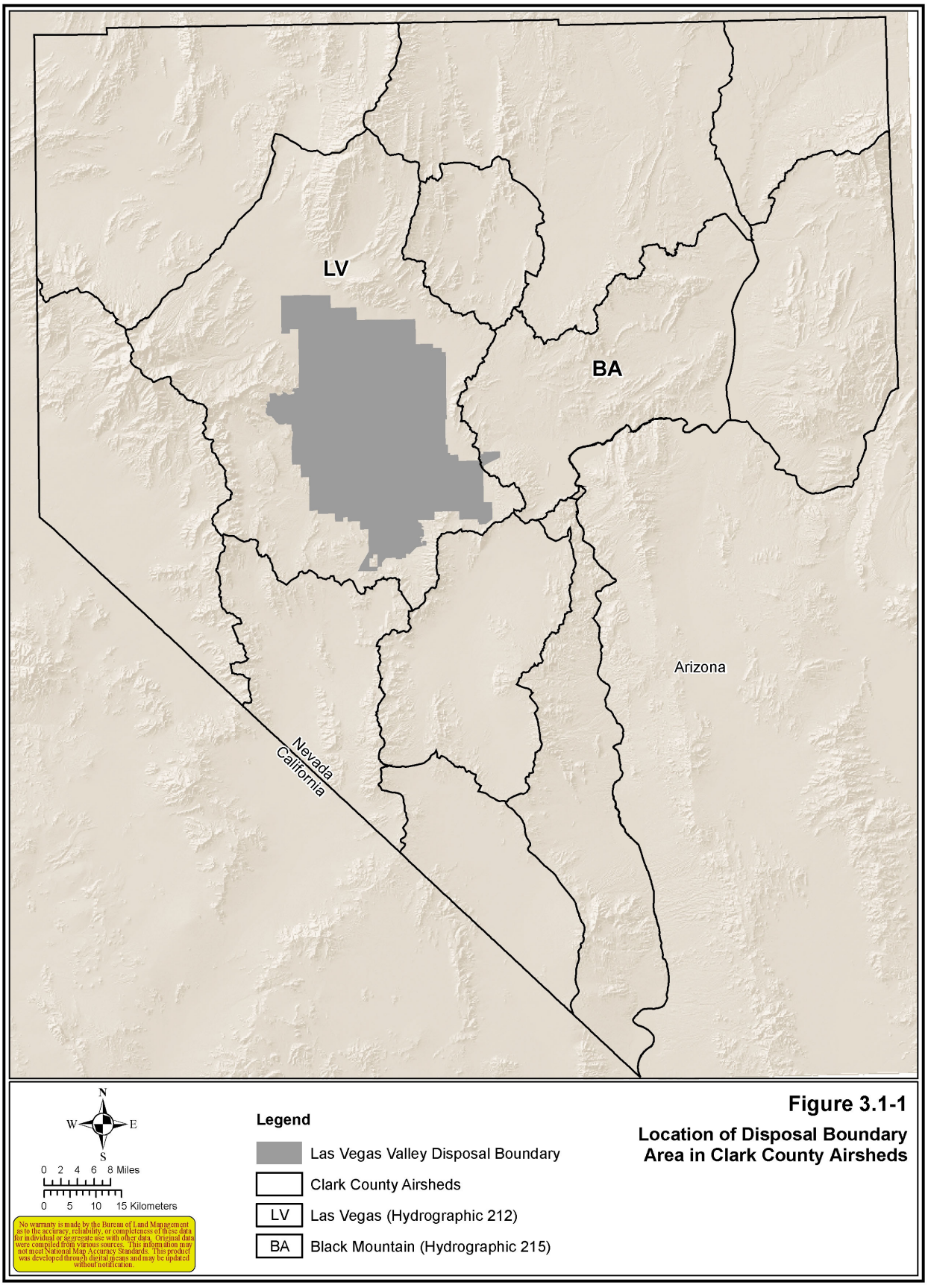


Figure 3.1-1
Location of Disposal Boundary Area in Clark County Airsheds

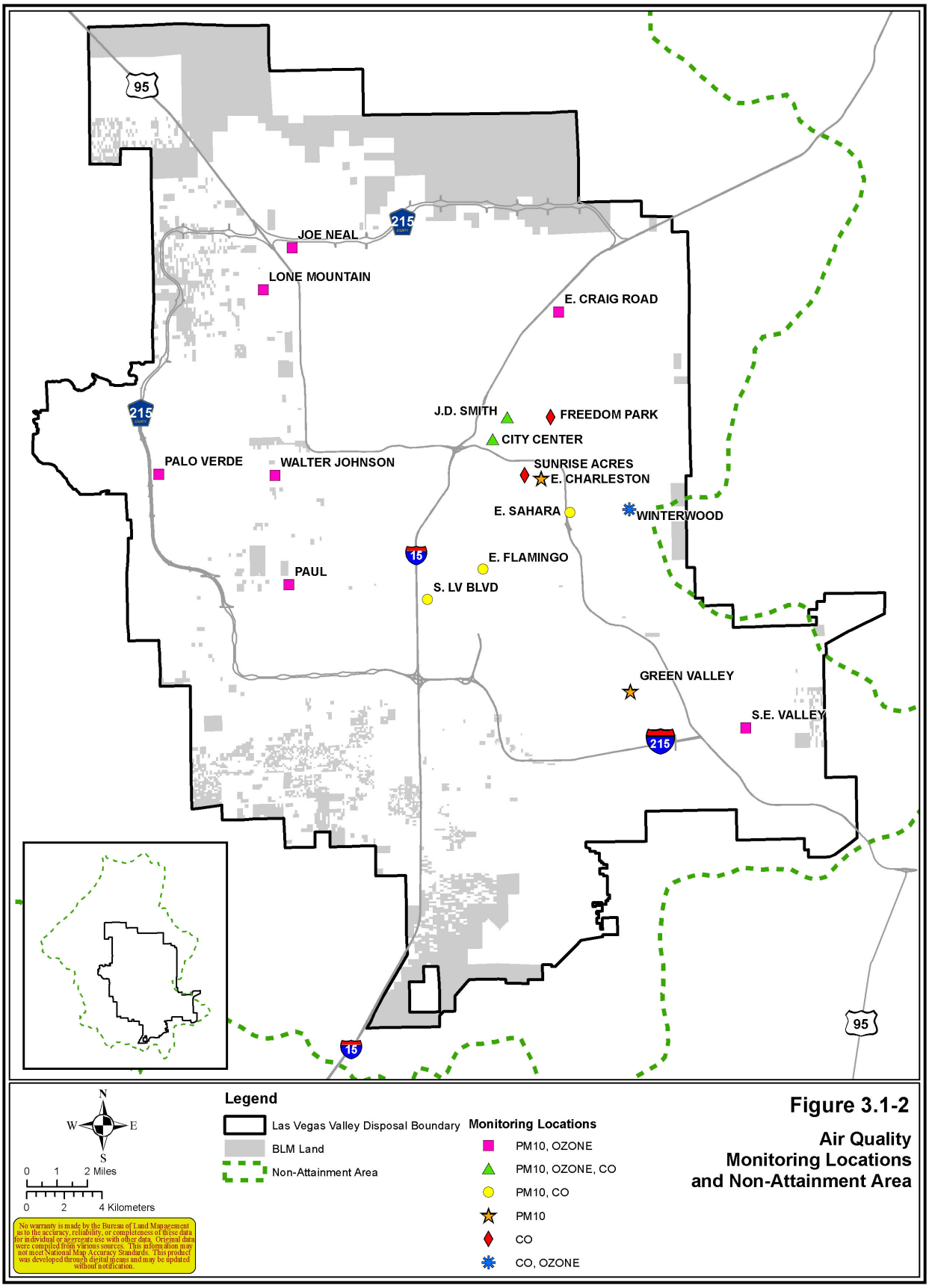


Figure 3.1-2

Air Quality Monitoring Locations and Non-Attainment Area

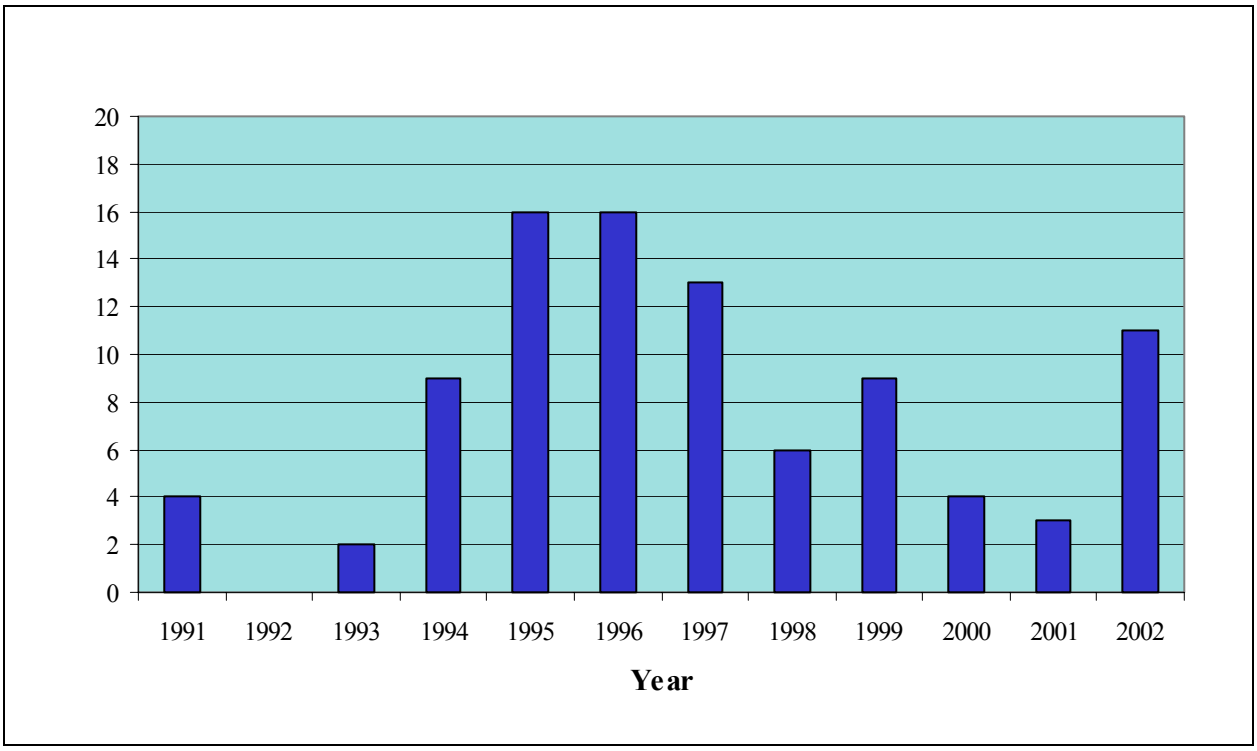


FIGURE 3.1-3
24-HOUR PM_{10} EXCEEDANCES PER YEAR

3.1.3.2 Carbon Monoxide

Carbon monoxide is formed by the incomplete combustion of fossil fuels and other carbon-containing materials. Carbon monoxide binds with hemoglobin in the blood and interferes with the exchange of oxygen and carbon dioxide in the respiratory and circulatory systems. Acute exposures to CO may cause dizziness, drowsiness, shortness of breath, and decreased respiratory function (EPA 2002a). There have been no violations of the NAAQS since 1999. Long term trends show improving air quality in Las Vegas with respect to CO since the 1980s when violations of the standard occurred between 18 and 41 times per year.

3.1.3.3 Ozone

Ozone is produced through a series of chemical reactions of NO_x with VOCs in sunlight. Ozone is an irritant of the respiratory system and health effects of exposure may include cough, throat irritation, increased responsiveness of asthma, increased susceptibility to respiratory system infections, and long term decreases in lung function (EPA 1997). Ozone is more prevalent from May through October when sunlight, high temperatures, and stagnant air conditions trigger its formation. Available data on O_3 measurements indicate that air quality in the Las Vegas Valley is not in compliance with the revised 8-hour NAAQS for O_3. Data from 2002 and 2003 indicate that the 8-hour O_3 standard was exceeded in the Valley at the Joe Neal monitoring location. The EPA designated Clark County as non-attainment for O_3 on April 15, 2004 but granted a request from the State of Nevada to defer the designation date to September 13, 2004 to allow additional analysis of the non-attainment area boundary.

The DAQEM completed an analysis to define the non-attainment area based on 11 factors, including items such as degree of urbanization, monitoring data, location of emission sources, traffic and commuting patterns, expected growth, meteorology, topography, control sources, air quality in adjacent areas, regional emission reductions, and jurisdictional boundaries. This analysis was submitted to EPA on August 4, 2004. The DAQEM is also completing a number of other O_3 studies

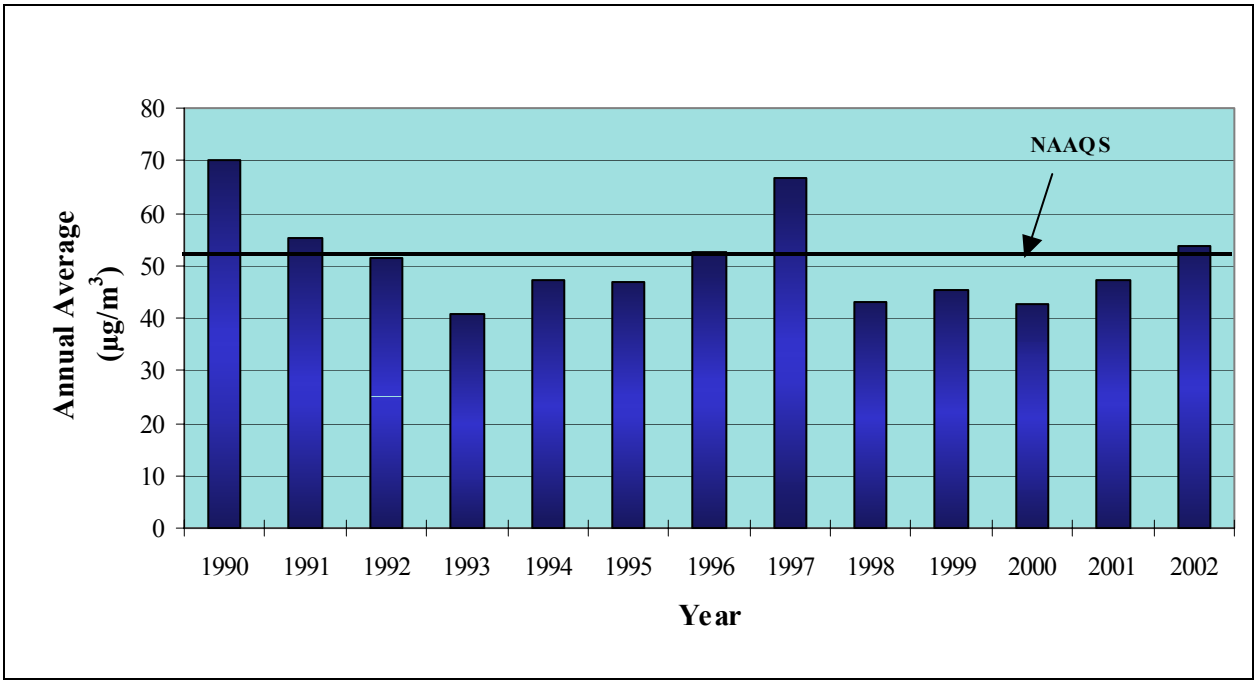


FIGURE 3.1-4
ANNUAL AVERAGE PM_{10} CONCENTRATIONS

and inventories including characterization, non-road engine inventory, evaluation of control measures, biogenic emissions from natural sources, O_3 precursors, and consumer products emissions of VOCs.

3.1.3.4 Lead

Lead is primarily emitted through combustion of leaded fuel in motor vehicles; however, emissions are on the decline due to reductions in the use of leaded fuel. Lead is absorbed by the respiratory tract and blood stream, and accumulates in the kidneys and liver. The nervous system may also be affected through inhalation of lead in the air and lead exposures have been related to high blood pressure and mental development problems in children (EPA 2003). The Las Vegas area is in attainment with the NAAQS for lead and this pollutant is not included in the ongoing ambient monitoring conducted in the region (U.S. Department of Transportation 2003).

3.1.3.5 Nitrogen Dioxide

Nitrogen oxides form in the high temperature combustion of fuels, motor vehicle exhaust, and the burning of organic wastes. At high concentrations NO_2 has been shown to cause lung damage. Nitrogen oxides are a precursor to O_3 and also contribute to the formation of acid precipitation and dry acid deposition from the atmosphere. Monitoring data for 2002 indicate that concentrations of NO_2 were higher near downtown Las Vegas but that air quality at all monitoring locations was below the NAAQS and there were no exceedances of the standard.

3.1.3.6 Sulfur Dioxide

Sulfur dioxide forms during the combustion of sulfur-containing fuels such as coal and oil. Effects of SO_2 on human health are primarily associated with the upper respiratory system, particularly in asthmatics and others suffering from respiratory ailments. Sulfur dioxide also contributes to the formation of acid precipitation and dry acid deposition from the atmosphere. The predominant sources of SO_2 in Clark County are the coal-burning power plants. Monitoring for SO_2 during 2002 in the Las Vegas Valley did not detect any exceedances of the standard.

3.1.4 Hazardous Air Pollutants

Hazardous or toxic air pollutants are those compounds which present a threat of adverse human health or environmental effects whether through ambient concentrations, bioaccumulations, deposition, or other methods. Section 112 of the CAA classifies 189 pollutants as hazardous. Monitoring was conducted in 2002 for hydrogen sulfide and ammonia that are considered hazardous pollutants. One value for hydrogen sulfide was detected between 0.09 and 0.12 ppm, while all other monitoring results had values of less than 0.04 ppm. The Nevada state standard for a one hour average is 0.08 ppm. There is no state or federal air quality standard for ammonia. Ammonia is an irritant of the lungs and mucous membranes and may be lethal in high concentrations. Monitoring for ammonia detected concentrations between 0.05 and 0.08 ppm in less than two percent of the measurements, with most values below 0.04 ppm.

3.1.5 Visibility / Haze

Visibility is generally referred to as the relative ease with which objects can be seen through the atmosphere under various conditions. Particulate matter and gases introduced into the atmosphere either absorb or scatter the light, reducing the amount of light a person can receive from a viewed object. The effect is a degraded aesthetic value of surrounding landscape.

Areas where visibility is an important value are designated under the CAA as Prevention of Significant Deterioration (PSD) Class I areas. These include national wilderness areas and national parks that exceed 5,000 and 6,000 acres, respectively. Although there are no Class I areas within the Las Vegas area, there are such areas located downwind. The closest Class I area is the Grand Canyon National Park in Arizona; others include Bryce Canyon National Park and Zion National Park, both located in the southern most portion of Utah. A Class II designation is given to areas in attainment status that can sustain a moderate increase in air pollutant concentrations without significant deterioration of the air quality. The Lake Mead National Recreational Area is designated a Class II area.

According to the DAQEM, visibility impairment occurs when visibility is reduced to less than 30 miles while the relative humidity is below 70 per cent. The highest haze levels tend to occur in late fall and winter when night and morning temperature inversions are most frequent and stagnant airshed conditions exist. Visibility is measured in two locations in the Valley; metropolitan Las Vegas and Henderson. In the 2002 monitoring data, the average annual visual range was 37 miles, a decrease from an average of 52 miles for 2001. The number of days where visibility was greater than 50 miles at noon was 92 for 2002, a decrease from 178 for 2001.

3.1.6 State Implementation Plans

Authorities responsible for air quality management in non-attainment areas are required to prepare a State Implementation Plan (SIP) that identifies and quantifies sources of emissions and provides a strategy for reducing emissions to achieve attainment status. Clark County DAQEM is the regulatory agency for air quality in the Las Vegas Valley. Clark County DAQEM has SIPs for CO and for PM_{10} and will be preparing a SIP for O_3, due to be completed in 2007.

The CO SIP was completed in September 2000, modified in January 2003, and approval by EPA on July 23, 2004. The plan requires use of gasoline with oxygenated components and reduced vapor pressure during the winter months, vehicle maintenance and inspection programs, an alternative fuels vehicle program, and voluntary ride-share programs. These controls do not directly impact management of BLM lands but vehicles used for activities on BLM lands must comply with the SIP requirements. The NAAQS for CO has not been exceeded in the Las Vegas Valley since 1999. The DAQEM is expected to request EPA to change the designation of the Las Vegas airshed from non-attainment to maintenance status.

The PM_{10} SIP was adopted by Clark County in June 2001 and approved by EPA in May 2004. The SIP included a detailed emissions inventory, evaluation of potential pollutant control measures, and regulatory requirements to impose effective control measures that are projected to result in

compliance with the 24-hour NAAQS for PM_{10} by 2006. The model domain used to demonstrate compliance was the BLM land disposal area established by SNPLMA (see Figure 1.3-2).

The SIP requires control measures to reduce PM_{10} emissions and these measures are implemented through a permitting program. Control measures applicable to disturbed vacant land include prevention of motor vehicle access and stabilization of disturbed areas. Control measures also apply to construction sites including use of dust suppressants, traffic control in construction areas, covers for haul trucks, surface stabilization measures, dust monitoring, and emissions limits based on opacity and distance of visual dust migration. Dust emissions from paved and unpaved roads are controlled through paving of unpaved roads with greater than 150 average daily trips, use of efficient street sweepers, shoulder stabilization, prevention of dust and dirt track out from construction sites, and use of dust palliatives on unpaved roads. Road, right-of-way, or other construction activities conducted on BLM lands are required to meet the permitting, monitoring, and control requirements for fugitive dust emissions specified in the SIP.

The approved PM_{10} SIP is under revision by Clark County. The SIP revision includes an inventory of construction activities, vacant land, and private unpaved roads. Emission factors for vacant lands are being refined and paved road PM_{10} emissions are being measured to update emission factors for these sources. Additionally, a reservoir depletion/recharging study of paved road PM_{10} emissions is also being completed as part of the SIP revision. Upon completion and approval of the revised SIP and attainment of the PM_{10} standard, the County would prepare a maintenance plan and re-designation request of attainment to EPA.

Section 176(c) of the CAA requires federal agencies to ensure that their projects conform to the provisions of the SIPs. These conformity regulations assert that a federal agency cannot approve or support an action which causes or contributes to new violations of any NAAQS, increases the frequency or severity of existing violations of any NAAQS, or delays the timely attainment of any NAAQS or any required interim emission reductions or milestones. Transfer of ownership and titles of land are not subject to a conformity determination because the action would not result in any emission increases (40 CFR 93.153(c)(2)(xiv)).

3.1.7 Emission Reduction Actions

The BLM has implemented several dust mitigation and control measures for compliance with DAQEM regulations. Since January 2004 approximately 40 parcels covering about 2,000 acres of vacant land administered by the BLM were determined not to meet air quality standards due to off-highway vehicle use, unauthorized construction activity, and other trespass activity such as dumping. All but 135 acres have been sold, leased for public purpose, or mitigation measures have been implemented to reduce fugitive dust consistent with the regulations. Mitigation measures implemented include barriers around parcels to control access, stabilizing surface with water, and development of a Memorandum of Understanding (MOU) with Clark County. The MOU will assist both agencies to better maintain compliance with construction activity and dust control permits. This MOU allows DAQEM to enforce dust regulations and benefit the land owner by removal of trespass activity as well as the clean-up and stabilization of disturbed areas.

3.2 EARTH RESOURCES

Earth resources include the physical surface and subsurface features including the geology and geologic hazards, minerals, and soils.

3.2.1 Geology

Geology is collectively defined as the topography, stratigraphy, and geologic hazards in the project area. Hazards can occur from seismic activity, subsidence, and ground fissures.

3.2.1.1 Topography

The Las Vegas Valley is located in the Great Basin region of the Basin and Range physiographic province. The Las Vegas Valley is an intermountain valley surrounded by generally north-south

trending mountain ranges as shown in Figure 3.2-1. The Valley is bordered on the north by the Las Vegas and Sheep ranges and on the east by Frenchman Mountain and River Mountains. Peak elevations of these ranges are between 1,500 feet and 7,000 feet above the valley floor. The Spring Mountains, which reach a maximum elevation of nearly 12,000 feet at Charleston Peak, are to the west. The McCullough Range lies southeast of the Valley and the Bird Spring Range is to the southwest.

The Las Vegas Valley surface topography generally slopes to the southeast with a slope of less than one percent where the valley floor is underlain by reworked sediments and erosional features. The valley floor is formed by a series of coalescing alluvial fans and drainage features. The alluvial fans slope towards the center of the valley, typically with slopes of 1.5 to 3 percent. The Las Vegas Wash and its tributaries form the active drainage system for the valley, discharging to Lake Mead south of Frenchman Mountain. The Valley is dissected by a number of generally north trending escarpments and incised channels of the active drainage system. The drainages would have intermittent flow under natural conditions; however, permanent base flow has been established in the Las Vegas Wash in response to irrigation runoff and treated wastewater discharges.

3.2.1.2 Stratigraphy

Bedrock and valley fill sediments are the geologic units that characterize the Las Vegas Valley. The time scale showing the succession of geologic strata is shown in Figure 3.2-2 and the general location of some of the formation that underlie the Valley are shown in Figure 3.7-1.

The mountain ranges to the west, east, and north consist primarily of Paleozoic and Mesozoic sedimentary rocks including sandstone, limestone, siltstone, and conglomerates. The mountain ranges to the south and southeast consist primarily of Tertiary volcanic rocks including basalts, andesites, rhyolites, and associated intrusive rocks that overlie Precambrian metamorphic and granitic rocks. The valley fill sediments predominantly consist of Miocene to Holocene age fine to coarse grained deposits (Longwell 1965).

The Las Vegas Valley is underlain by Quaternary and Tertiary deposits. The Thumb and Horse Spring formations occur under the Las Vegas Valley and are comprised of siltstone, sandstone, conglomerate, freshwater limestone, gypsum beds, and lava flows. The Miocene and Pliocene Muddy Creek Formation and overlying younger deposits are generally thought to comprise the valley fill. The Muddy Creek Formation includes clayey silt and silty clay; interbedded gravel, sand, silt, and clay; fanglomerates; and fine sandstone, siltstone, and clay (Longwell 1965).

The Muddy Creek Formation is overlain by up to 1,000 feet of Tertiary and Quaternary basin fill deposits in the Las Vegas Valley. These fill deposits of gravel, sand, silt, clay, and conglomerates contain abundant carbonate clasts, and consist of coarse-grained deposits, fine-grained deposits, and thin interbedded coarse- and fine-grained deposits. Coarse-grained deposits generally occur on alluvial fans and pediments near the valley margins and along the Las Vegas Wash. Most of the Quaternary deposits consist of poorly sorted, unconsolidated to cemented gravel and sandy gravel on alluvial fans, and fine sand along the Las Vegas Wash. Sand along the Las Vegas Wash is less than 10 feet thick, and coarse-grained deposits on alluvial fans and pediments are generally less than 30 feet thick (Longwell 1965).

3.2.1.3 Geologic Hazards

The geologic setting of the Las Vegas Valley indicates that there are geologic hazards present in the area. Geologic processes that could result in property damage and hazards to safety include earthquakes, slope instability, and land subsidence.

Earthquake Hazards

The current level of seismicity in southern Nevada is relatively low compared to more active parts of the Basin and Range Province (Harmsen 1991). There have been no major earthquakes with a magnitude greater than 6.0 on the Richter scale in the vicinity of Las Vegas since at least 1852. The record of seismicity in southern Nevada is dominated by small earthquakes (magnitude less than 4.0) that generally occur in two areas. One area is

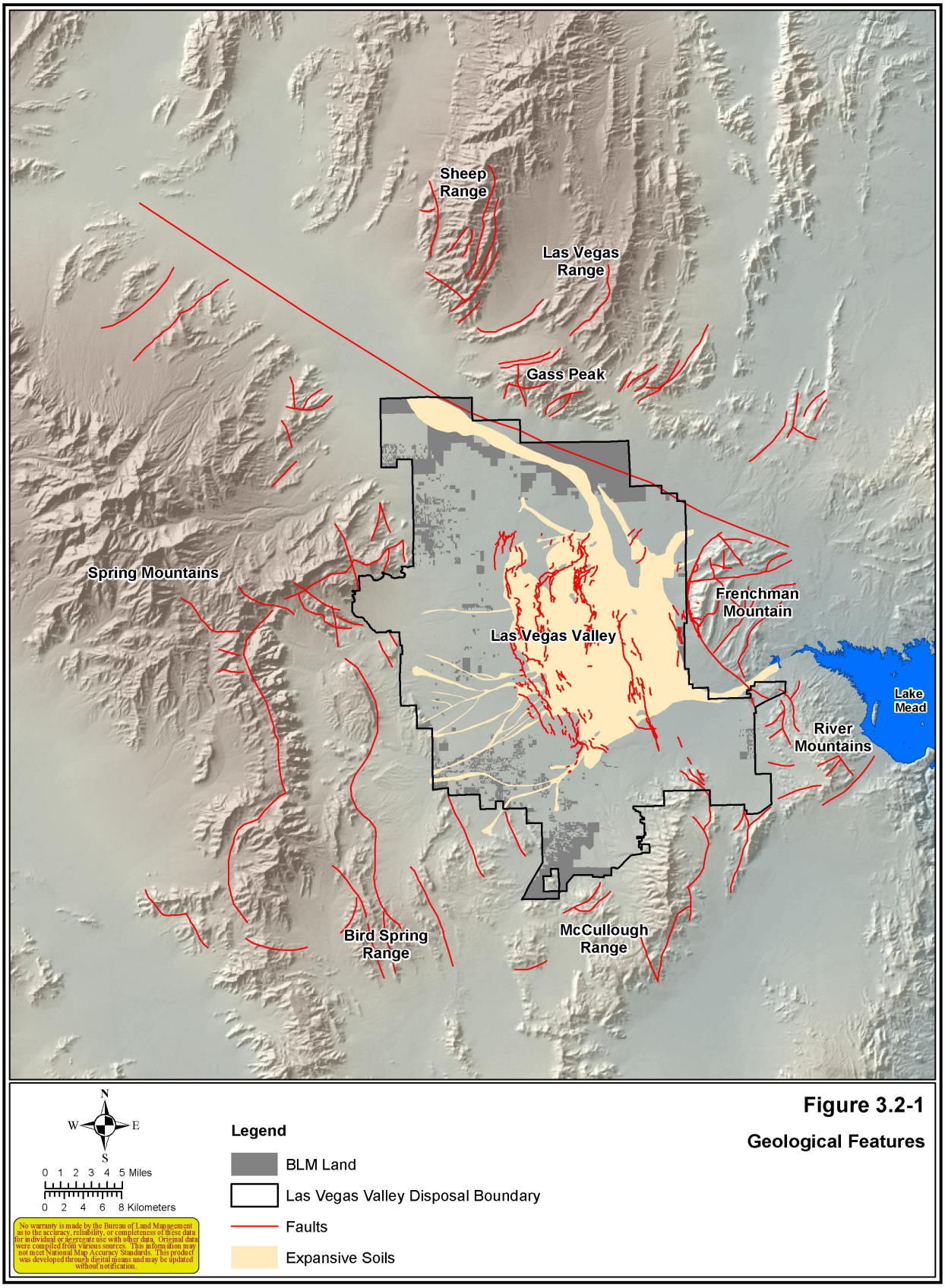


Figure 3.2-1

Geological Features

Geologic Time Scale

Era	System & Period	Series & Epoch	Some Distinctive Features	Years Before Present
CENOZOIC	Quaternary	Recent	Modern man.	11,000
		Pleistocene	Early man; northern glaciation.	1/2 to 2 million
	Tertiary	Pliocene	Large carnivores.	13 ± 1 million
		Miocene	First abundant grazing mammals.	25 ± 1 million
		Oligocene	Large running mammals.	36 ± 2 million
		Eocene	Many modern types of mammals.	58 ± 2 million
		Paleocene	First placental mammals.	63 ± 2 million
MESOZOIC	Cretaceous		First flowering plants; climax of dinosaurs and ammonites, followed by Cretaceous-Tertiary extinction.	135 ± 5 million
	Jurassic		First birds, first mammals dinosaurs and ammonites abundant.	181 ± 5 million
	Triassic		First dinosaurs. Abundant cycads and conifers.	230 ± 10 million
PALEOZOIC	Permian		Extinction of most kinds of marine animals, including trilobites. Southern glaciation.	280 ± 10 million
	Carboniferous	Pennsylvanian	Great coal forests, conifers. First reptiles.	310 ± 10 million
		Mississippian	Sharks and amphibians abundant. Large and numerous scale trees and seed ferns.	345 ± 10 million
	Devonian		First amphibians; ammonites; fishes abundant.	405 ± 10 million
	Silurian		First terrestrial plants and animals.	425 ± 10 million
	Ordovician		First fishes; invertebrates dominant.	500 ± 10 million
	Cambrian		First abundant record of marine life; trilobites dominant.	600 ± 50 million
	Precambrian		Fossils extremely rare, consisting of primitive aquatic plants. Evidence of glaciation. Oldest dated algae, over 2,600 million years; oldest dated meteorites 4,500 million years.	

FIGURE 3.2-2
GEOLOGIC TIME SCALE

in the vicinity of the Nevada Test Site, which suggests the seismographs were recording underground nuclear explosions, and the other is in the Lake Mead area, which may be related to strain release in the crust after the lake was filled (Rogers et al. 1991, Rogers and Lee 1976). Faulting in the vicinity of the Las Vegas Valley is shown on Figure 3.2-1.

The Las Vegas Valley is located within Seismic Zone 2B as defined in the Uniform Building Code (International Conference of Building Officials 1997). Zone 2B is defined as an area with moderate damage potential. The potential for damage from seismic activity becomes more severe in Zones 3 and 4. Current design practices require facilities to be built to Seismic Zone 4 standards.

Subsidence

Subsidence is the sinking of the earth's surface. It generally occurs as a result of a decrease in hydraulic pressure in the subsurface due to the withdrawal of groundwater in regions with confined aquifers. In confined aquifers, the hydraulic pressure is greater than hydrostatic pressure, and relief of the excess pressure through pumping allows compaction of the aquifer materials. This process is partially reversible, meaning that if water pressures are allowed to recover, some reversal of subsidence will occur.

Ground Fissures

Fissures are substantial cracks, breaks, or fractures in rocks. Fissures are caused by differential subsidence along fault scarps in the valley and have damaged overlying structures (Bell 2001). Ground fissures up to six feet deep, nine feet wide, and a half-mile long have been observed in the Las Vegas Valley (Ninyo & Moore 2003). Fissures may widen by a variety of processes, becoming filled with slumped material and other runoff-carried debris. Reactivation of tensile stress may widen and/or deepen existing fissures. Generally fissures are greater in size and occur more frequently in proximity to existing faults.

3.2.2 Mineral Resources

Mineral resources are classified as locatable, leasable, or salable. Locatable minerals are those that can be located and claimed under the Mining Act of 1872. Mining for these minerals requires staking a claim rather than receiving a lease issuance. Leasable minerals such as oil and gas, coal, and geothermal resources are leased under the Mineral Leasing Act of 1920 and its amendments of 1987. Salable minerals are those materials such as sand, gravel, and construction material that are sold or permitted for extraction under the Mineral Materials Sale Act of 1947.

3.2.2.1 Locatable Minerals

Mining of manganese, a locatable mineral, at the Three Kids Mine near Henderson began in 1917. The deposit has not been mined since the 1960s and at current commodity prices the remaining quantity and grade of ore are not economically viable for mining. Gypsum is present in several formations in the Las Vegas Valley and mining is actively occurring outside the disposal boundary area to the northeast at Pabco and to the southwest at Blue Diamond Mine. However, the value of gypsum as a commodity is relatively low; therefore, it is generally not economically feasible to mine this commodity in areas where other land uses have greater economic value, including the urban areas surrounding Las Vegas. No other metallic minerals have been mined in the disposal boundary area or nearby locations.

Significant mineral exploration has occurred throughout Nevada. Most potential mining districts and ore bodies have been identified. Vein or lode deposits may be located beneath the Las Vegas Valley. However, the valley is underlain by a thick sequence of unconsolidated and weakly consolidated sediments, which make exploration difficult and would result in high extraction costs for any deposits located. Therefore, the mining industry has focused exploration and development activities in other established mining districts in Nevada.

Land records maintained by BLM indicate that mining claims have been filed on 158 parcels of the remaining BLM land within the disposal boundary area. Many parcels have multiple claims filed within their boundaries. The claims provide prospective miners with the right to explore for mineral resources; however, maintaining an active claim requires fees or physical improvements to the claim each year. Under the Mining Act of 1872, mining claims are required to contain a "discovery of a valuable mineral deposit"; meaning that a potentially economic mineral deposit exists and could be extracted. There are no mining operations for locatable minerals within the disposal boundary area and there is no recent exploration activity or interest by the mining industry.

3.2.2.2 Fluid Leasable Minerals

Commercial oil and gas accumulations have not been discovered in the Las Vegas Valley or nearby areas. Petroleum source rock evaluations indicate that the region has a thermal history suitable for the generation of oil and gas; however, source rock analyses have failed to identify strata with sufficient organic carbon content to act as a significant petroleum source (Nevada Bureau of Mines and Geology 1992). There has not been an exploration well drilled in the area since the mid 1980s. The U.S. Geological Survey assessment of oil and gas potential for the region has categorized all of the potential accumulation targets as hypothetical, reflecting the lack of successful exploration efforts in the area. (Peterson and Grow 1995)

Commercial development of geothermal resources requires temperatures of at least 194 degrees Fahrenheit (°F). Higher temperatures of not less than 350°F are needed for direct application uses (such as power generation). A water temperature of 145°F (the hottest water in Clark County) occurs at Black Canyon Springs near Hoover Dam. The low temperatures of waters in southern Nevada preclude their use as a geothermal energy source, except for small scale uses such as space heating, swimming pools, and spas. There are no existing geothermal leases within the disposal boundary area.

3.2.2.3 Solid Leasable Minerals

There is limited potential for occurrence of economic accumulations of solid leasable minerals in the Las Vegas Valley. Sodium and potassium may occur in evaporate deposits that are present in valley fill sediments; however, the depth of these accumulations and costs related to overburden removal or underground mining would make these types of deposits economically non-viable.

3.2.2.4 Salable Minerals

The Las Vegas Valley is an area of high potential for salable mineral materials, including sand and gravel (BLM 1998). A large-scale sand and gravel quarry is actively operating just outside the disposal boundary area in the southern part of the Valley, west of Henderson. Sand and gravel operations located within the airshed (Hydrographic basin 212) covered by the SIP for particulate matter are strictly regulated to control particulate matter emissions to conform to SIP requirements. Most growth in extraction of mineral materials is expected to occur outside the disposal boundary area (which is also outside the PM_{10} SIP boundary) to avoid the costs of air quality compliance.

3.2.3 Soils

Soils in the Las Vegas Valley are generally composed of gravel, windblown sands, and fine grained silts and clays. The degree of soil development in the area ranges from thin, poorly developed soils overlying competent bedrock to stratified soils with well-developed subsoils and caliche horizons. Soils on alluvial fans along the valley margins are typically deep, gravelly fine sandy soils. Fine sandy soil horizons are typically present in broad, flat areas along the flanks of alluvial fans known as sand sheets. Desert pavement consists of closely spaced pebbles and rock fragments and covers large areas of the Valley, especially in upland portions of alluvial fans and along ephemeral washes.

Soils in the Valley exhibit some susceptibility to water erosion in gently sloping, undisturbed areas but disturbed soils and steep slopes are much more susceptible to erosion, especially along the

washes. Most soils in the valley can be eroded by wind action. The susceptibility of soils to wind erosion is significantly greater where desert pavements or cemented layers at the ground surface are disturbed. Once soils have been disturbed or vegetation is lost due to surface disturbance or drought, vegetation may not be easily re-established because of the salinity and alkalinity of the soils. Valley floor soils typically have a low field capacity and high permeability. These characteristics increase the irrigation demand for plant growth on these soils (Soil Conservation Service 1985).

The susceptibility of soils to wind erosion has been evaluated as part of the air quality modeling conducted for the Las Vegas Valley (Argonne 2004). To characterize the potential for wind erosion of soils, Argonne evaluated the Wind Erodability Group (WEG) classification of soils and soil stability in the Las Vegas Valley. The WEG classification is based on soil texture, with soils containing more fine-grained material having more potential for wind erosion compared to coarse-grained soils. Soil stability is a measure of the ability of a soil to withstand erosive forces based on the cohesiveness of soil materials. Both WEG and soil stability are considered in determining the overall susceptibility of soils to wind erosion. While soils in low value WEGs are always considered to be resistant to soil erosion, soils that have high wind erodability based on soil texture may have reduced susceptibility to wind erosion if the soil is highly cohesive, as measured by soil stability. Because the Las Vegas Valley has high rates of soil moisture evaporation, soils with soluble salts and carbonate minerals can become stable through formation of crusts and cemented zones as soil moisture decreases and mineral precipitation occurs. Stabilization of soils through these processes depends on the concentration of soluble minerals in the soil matrix. Argonne adapted soil composition data to provide a measure of soil stability.

Most of the land within the disposal boundary area that is available for disposal and development are estimated to have a soil stability of 20 percent, which indicates that the soil mobility expected from the WEG classification in most areas has been reduced by this amount by formation of soil crusts. To verify the relationship of soil composition to soil stability and to evaluate the impact of surface disturbing activities on soil stability, physical tests of soils were conducted at select locations to verify the mechanical properties of undisturbed and disturbed soils. To characterize the relationship between soil stability, erodability and soil erosion rates under different wind conditions, wind tunnel tests were performed at several locations. These tests provided quantifiable rates of suspension of different soils as a function of wind speed, and this information was incorporated into air quality modeling performed for the area.

Within the Las Vegas Valley some soils are disturbed by a variety of activities including construction and off-road vehicle traffic. Disturbed soils are characterized by broken surface crusts and disturbed soils are more susceptible to erosion by wind and water. In order to include consideration of disturbed soils in the evaluation of wind erosion and the contribution of these conditions to airborne particulate matter, Argonne conducted field evaluations of soil disturbance for a variety of conditions. The results of the field surveys and wind tunnel tests on disturbed soils were compared to aerial photographs to determine the appearance of disturbed soils. Aerial photography throughout the Valley was then evaluated and soil disturbance was estimated across the area. Based on these evaluations, over 90 percent of BLM managed land within the disposal boundary area has been identified as having less than 10 percent soil disturbance. Over 95 percent of BLM managed land has less than 20 percent soil disturbance. The evaluation of soil disturbance shows that limited areas within the disposal boundary area have highly disturbed soils and most areas with high soil disturbance are associated with large construction and development projects on lands that are not managed by BLM. The BLM managed lands with greater than 20 percent soil disturbance are typically small parcels of land that are interspersed with non-federal lands in urbanized areas of the Valley.

Soil swelling may occur where soils include relatively high percentages of expandable clay materials. These clay minerals adsorb considerable volumes of water onto the surface of very fine grained particles and as a result, the soils swell or

expand. Swelling can cause differential soil movement in the zone where moisture content of the soil is impacted by infiltration of precipitation and evapotranspiration. This differential movement presents a potential hazard to engineered structures constructed on these soils. Areas potentially containing expansive soils are shown on Figure 3.2-1.

Soil erosion and redeposition may occur in the Valley as a result of sheet flow, channel erosion, and sedimentation during and after storm and wind events. Ephemeral stream channels or washes are susceptible to erosion and bank collapse during high flow conditions. Incised channels are common, especially on the flanks of alluvial fans and along the major drainages of the valley floor. Debris flows occur on the slopes of alluvial fans near the foot of mountain ranges. Sediment deposition typically occurs on active alluvial fans and in drainage channels.

3.3 WATER RESOURCES

Water resources include the surface and groundwater sources, floodplains, water quality, and water supply and demand.

3.3.1 Surface Water

The Las Vegas Valley is drained by the Las Vegas Wash, which is a tributary of the Colorado River. The watersheds that cross the disposal boundary area all contribute flow to the Las Vegas Wash. The hydrographic basins (watersheds) and major tributaries of the Las Vegas Valley are shown on Figure 3.3-1. Each of the watersheds has been impacted to varying degrees by the amount of urban development in the drainage area. The hydrology of the Valley has been extensively modified to provide drainage and flood control for urban development in the Las Vegas metropolitan area. Drainage improvements have included construction of flow channels, culverts, and detention basins. Flow channels and culverts divert channel flow and flood waters from developed areas and roadways. Detention basins provide temporary storage capacity for peak flow from storm events and control the release of flows to protect downstream structures from flooding. The basins promote infiltration of impounded water into shallow groundwater, contributing to the groundwater system and allowing gradual discharge back to the drainage system.

In its natural state the Las Vegas Wash was an intermittent stream that flowed only during and immediately after storm events. Urban development including channelization of stream courses, installation of storm drains, increasing impervious land cover, and increasing treated wastewater discharges have altered the hydrology of the Las Vegas Wash, which now has permanent flows. Permanent flow in the Las Vegas Wash comes from treated wastewater discharges, irrigation and urban runoff, discharges of shallow groundwater, and storm water. Urban development and channelization of washes have also decreased the width of floodplain areas and associated wetlands. It is estimated that 20th century development in the Las Vegas Valley has resulted in a decrease of 1,800 acres of wetlands along the Las Vegas Wash (Hestor and Gear 2002).

Runoff from storm events in the Las Vegas Valley and surrounding mountains can result in flows ranging from 500 cubic feet per second (cfs) to greater than 10,000 cfs (323 to 6,463 million gallons per day [mgd]) in the Las Vegas Wash. A record-breaking flood that occurred in July 1999 generated a peak flow of 16,000 cfs (10,340 mgd) (Sutko 1999). These peak flows erode the banks and degrade the channel of the Las Vegas Wash, which in turn causes sedimentation in Las Vegas Bay and Lake Mead. The Southern Nevada Water Authority (SNWA) has developed a plan to reduce channel degradation in the Las Vegas Wash and to restore adjacent wetland areas. The SNWA is constructing a series of 27 grade control structures and 27,000 feet of bank protection in or adjacent to the Las Vegas Wash between Lake Las Vegas and the Harmon Avenue alignment.

3.3.1.1 Floodplains

The projected and historical flow rates of the Las Vegas Wash for the 100-year frequency flood event are significant. The 100-year flood flows of the Las Vegas Wash varied throughout the basin from approximately 13,000 cfs in the upper wash in the northern portion of the disposal boundary area to approximately 19,000 cfs in the lower

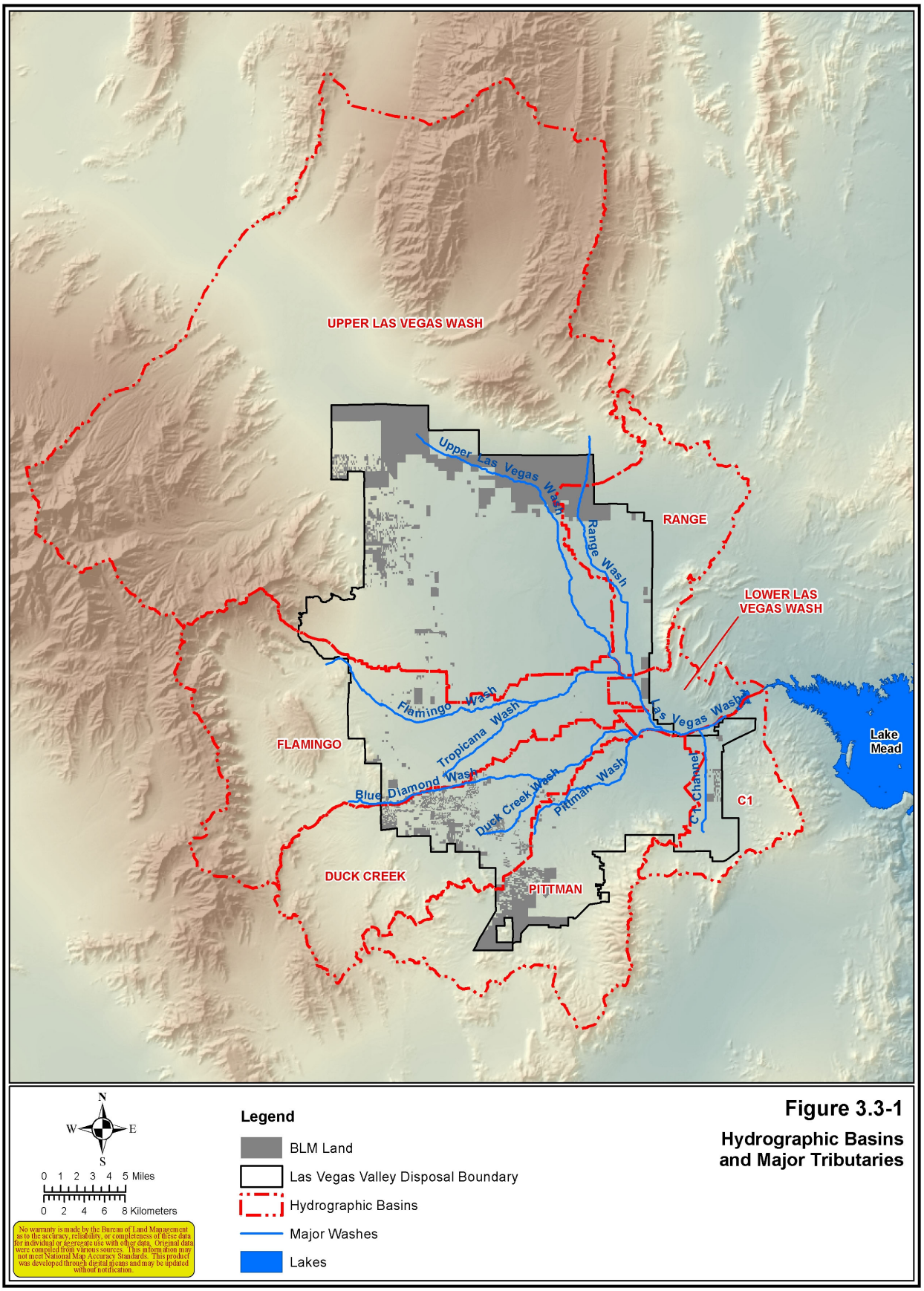


Figure 3.3-1

Hydrographic Basins and Major Tributaries

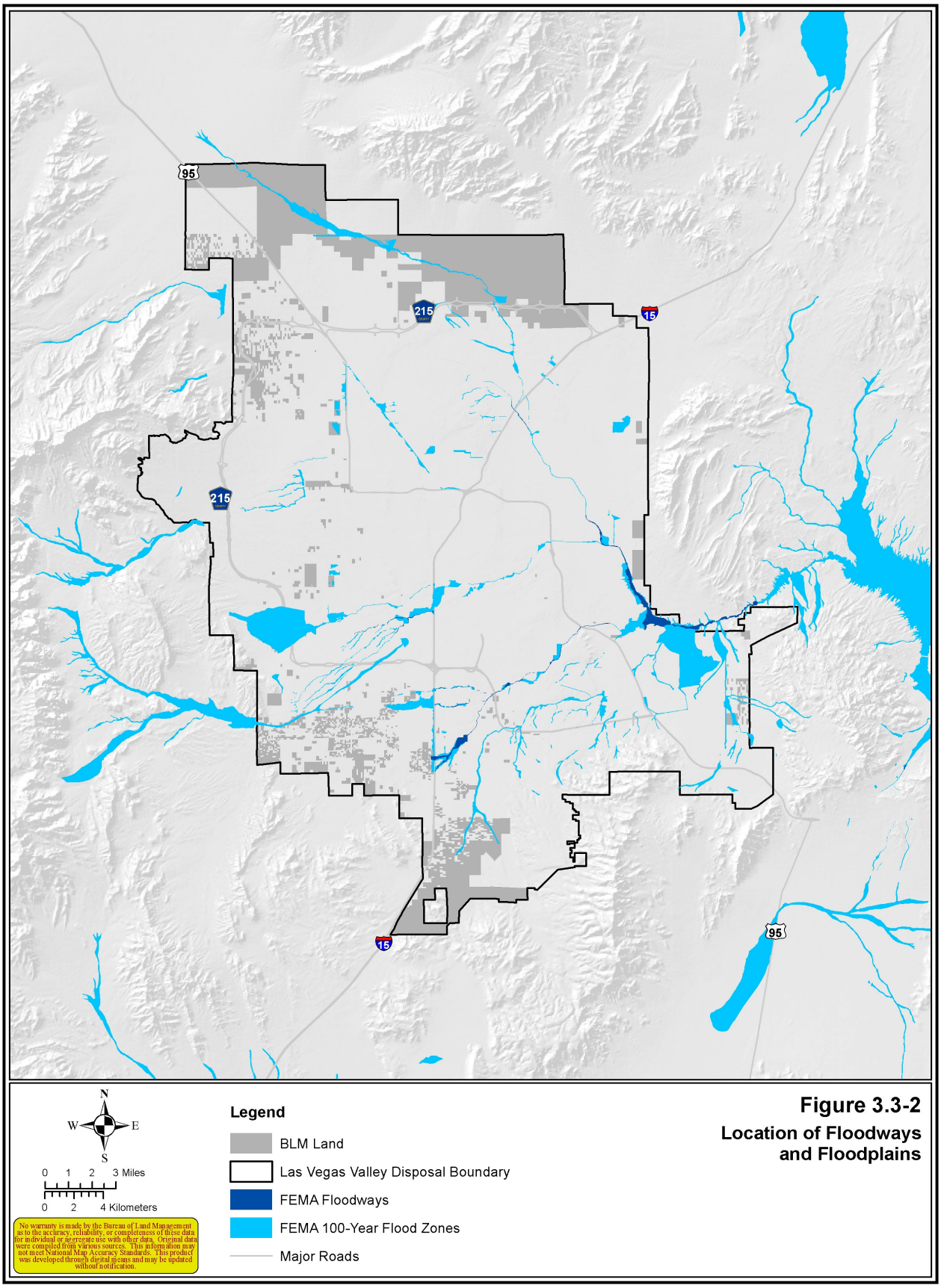


Figure 3.3-2
Location of Floodways and Floodplains

wash along the eastern boundary (PBS&J 2002). The 100-year frequency flood event is defined as having a one percent chance of occurrence in any given year. The Federal Emergency Management Agency (FEMA) and local entities regulate activity on the Las Vegas Wash within the 100-year frequency flood event floodplain to plan for and protect life and property from flooding. The FEMA has delineated and published maps, which are developed from computer-based hydraulic models showing the 100-year floodplain and floodway for the Las Vegas Wash. The floodway is where the water is likely to be deepest and fastest and it is the area of the floodplain that should be kept free of obstructions to allow floodwaters to move downstream. The floodplain varies significantly in width ranging from 200 to 2,500 feet across (PBS&J 2002). The 100-year floodplains and floodways in the disposal boundary area are shown in Figure 3.3-2.

The Clark County Regional Flood Control District (CCRFCD) is responsible for developing and implementing a comprehensive flood control master plan to alleviate flooding in the Las Vegas Valley. The CCRFCD completed the Master Plan Update (MPU) in 2002 assuming all available land in the Valley had been fully developed. The 2002 MPUserves as a planning tool for the implementation of the flood control system in the Valley and the design and construction of master plan facilities. The proposed and existing flood control facilities in the disposal boundary area are shown in Figure 3.3-3.

3.3.1.2 Surface Water Quality

The Las Vegas Wash drains 1,600 square miles of the Las Vegas Valley of which approximately 20 percent is developed. Flow from the Las Vegas Wash makes up less than two percent of the water flowing into Lake Mead but it has a direct effect on the water quality of the lake, which is an important drinking water source for Nevada, Arizona, and California. Factors that contribute to poor water quality in the Las Vegas Wash include high concentrations of soluble salts in soils, storm water transport of contaminants and sediments, dry weather urban discharge, and intercepted shallow groundwater.

Low rainfall and high evaporation rates lead to high concentrations of soluble salts in shallow soils. Precipitation dissolves a portion of these soil minerals resulting in increased dissolved solids content in runoff and infiltration. Salt present in windblown dust also increases the salinity of surface water when dust is deposited on surface water bodies.

Storm water and urban runoff are considered nonpoint sources of pollution because they transport various contaminants to the Las Vegas Wash. These contaminants include pesticides and herbicides from lawns and golf courses, bacteria from pet waste, and oil and chemicals from cars, driveways, and roadways. High flows during storm events are erosive are carry large amounts of total suspended solids.

Dry weather urban discharge and intercepted shallow groundwater contribute about 15 percent of the annual flows in the Las Vegas Wash. Dry weather urban discharge is generally due to the excess water of urban uses such as irrigation. Similar to storm water, dry weather discharge carries contaminants from the streets to the Las Vegas Wash. The volume of annual dry weather runoff discharged to the Las Vegas Wash from the urban area has been estimated at slightly over 25,000 acre-feet per year.

Shallow groundwater refers to water that is less than 30 feet below land surface in the central and southeast parts of the Las Vegas Valley. Groundwater has become a significant component of the flow in the Las Vegas Wash as a result of the channel deepening that allows increasing interception of groundwater. Shallow groundwater has high salinity and potentially carries chemical compounds including perchlorate from past industrial practices.

3.3.2 Groundwater Resources

The four hydrogeologic units that comprise the Las Vegas basin include:

- Shallow aquifer – varies in depth from 0 to 50 feet below ground surface; water table is usually encountered within 20 feet of ground surface.

- Near surface reservoir – ranges in depth from 0 to 200 feet with the water table usually encountered at depths greater than 20 feet below ground surface.

- Principal aquifer – most of the groundwater supply comes from this zone of confined and semi-confined water at depths exceeding 200 feet below the water table.

- Regional carbonate aquifer – is several thousand feet below the ground surface and is not utilized as a source of water supply (BOR 1992).

These units form a complex sequence of intermixed deposits of boulders, gravels, sands, silts, and clays. The units vary in depth and thickness, which makes it difficult to differentiate between them at any particular site. The most permeable and productive basin-fill deposits are along the west side of the Valley as compared to the central or eastern portions of the Valley (USGS 1987).

3.3.2.1 Groundwater Recharge

There are two main sources of groundwater recharge in the Las Vegas Valley. The first source is natural recharge from snowmelt, runoff, and precipitation falling directly on the northern parts of the Spring Mountains and Sheep Range. The second source of recharge, especially to the shallow aquifer and the near surface reservoir includes infiltration of treated effluent and industrial and irrigation water. Prior to urbanization, the near surface reservoir was recharged by upward artesian flow from the principal aquifer. However, this artesian flow has deteriorated due to excessive domestic and commercial extraction of groundwater.

Artificial groundwater recharge has been conducted in the Las Vegas Valley to restore water levels that have been reduced by pumping over time. Groundwater has been pumped into the shallow aquifer to help mitigate land subsidence that has been observed in the valley. Subsidence related to groundwater withdrawal occurs when reduced water levels in aquifers result in decreased water pressure, which allows compaction of aquifer materials. Artificial recharge through groundwater reinjection is also used to maintain water levels and aquifer pressures in the principal aquifers so that these productive zones can be used on a seasonal basis to meet peak demand for water during the summer months.

Artificial groundwater recharge is performed during the winter months when seasonal demand is much lower, and available water supply from surface sources can be treated and injected to restore water levels in the valley aquifers. Natural recharge from the valley floor is not a significant source of recharge, as natural recharge occurs primarily along the valley margins, where ephemeral streams flow onto the valley floor and a large component of flow infiltrates into the subsurface. Because only approximately 10 percent of precipitation in the valley floor contributes to recharge, the average annual recharge rate for undeveloped land is approximately 0.4 inches per year, and impervious surface cover associated with development would reduce the net recharge rate in the valley to approximately 0.2 inches per year.

Artificial recharge in the Valley using Colorado River water is a primary factor to maintain reasonable water levels and reduce the potential of subsidence in the principal aquifer. The Las Vegas Valley Water District plans to recharge approximately 35,000 acre-feet per year into the 21st century (LVVWD 1991).

Natural recharge from the valley floor is not a significant source of recharge, as natural recharge occurs primarily along the valley margins, where ephemeral streams flow onto the valley floor and a large component of flow infiltrates into the subsurface. Approximately 10 percent of precipitation in the valley floor contributes to recharge, and the average annual recharge rate for undeveloped land is approximately 0.4 inches per year.

Groundwater used for drinking water is generally produced from the principal aquifer at depths ranging between 250 and 1,600 feet from productive zones in coarse-grained valley fill sediments on the west side of the valley (Kaufmann 1978, Donovan 1996). The alluvial deposits in the central and eastern portions of the Valley consist of

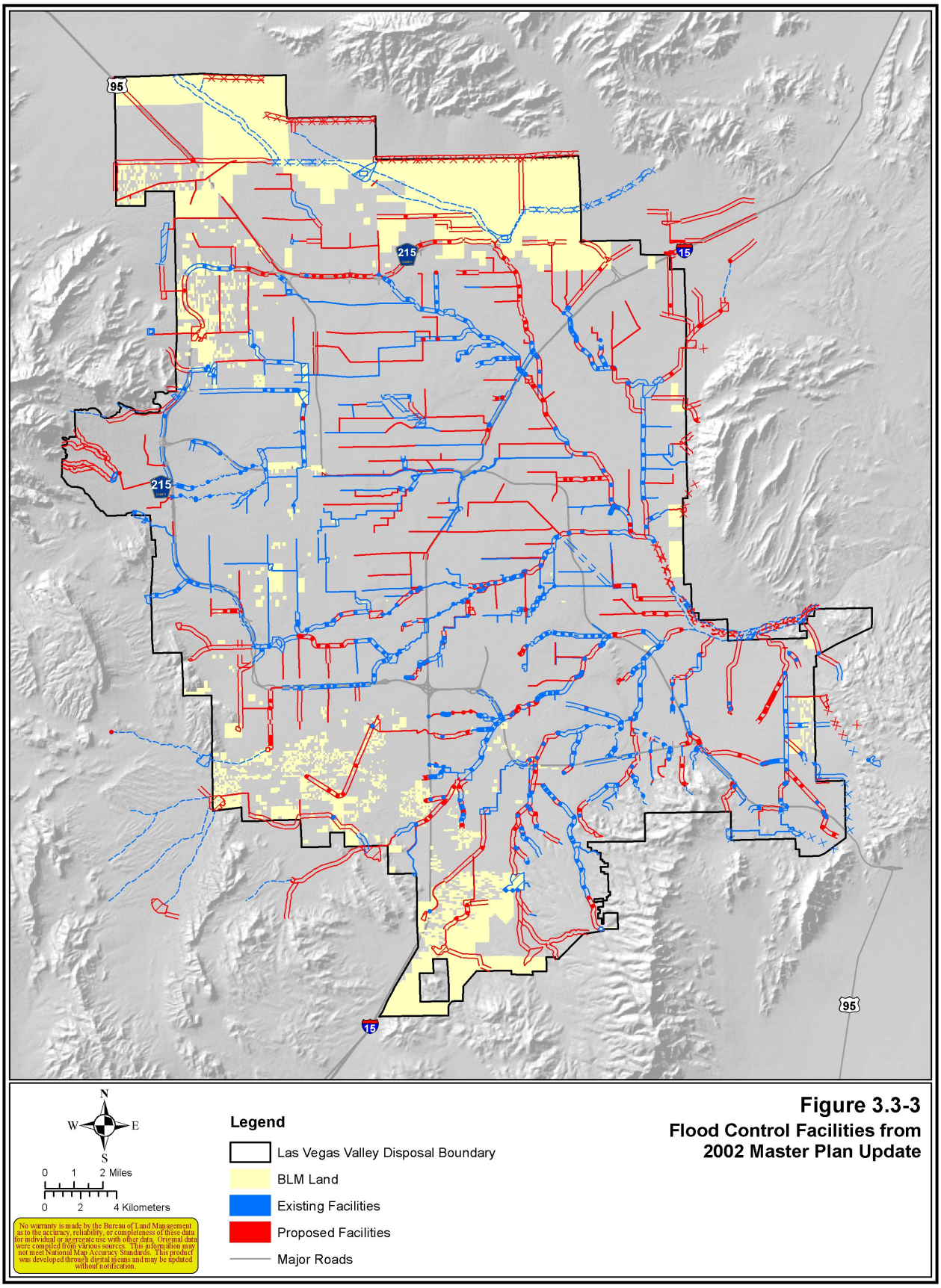


Figure 3.3-3
Flood Control Facilities from 2002 Master Plan Update

fine-grained sediments and the principal aquifer is less productive in these areas (Dettinger 1987, Donovan 1996).

3.3.2.2 Groundwater Flow

Groundwater flow is characterized by artesian interbasin flow consisting of recharge in the mountains, horizontal movement within the basin margins, discharge to the central basin floor through water supply pumping, discharges into surface water features, and evapotranspiration. Nearly all of the groundwater supply in the basin comes from the valley fill groundwater reservoir, which consists of the Muddy Creek Formation and the overlying Quaternary alluvial fan deposits.

Groundwater in the shallow units generally flows to the southeast across most of the Valley, discharging to the Las Vegas Wash. Shallow groundwater flows northeast in the southeast part of the Valley and also discharges to the Las Vegas Wash (Converse Consultants 1985). Channels, washes, or mounding related to irrigation may cause local variations in the direction of groundwater flow (Zikmund 1996). Water levels in the near-surface reservoir generally slope eastward toward the base of Frenchman Mountain, the lowest point in the Valley. Groundwater flow in the near surface reservoir is primarily towards the east; however, the amount of water moving through the near-surface unit is believed to be small due to the low permeability of the unit (Malmberg 1961).

The shallow aquifers were the main source of groundwater used in the Las Vegas Valley before 1940. The middle zone of the principal aquifer is the largest source of groundwater in the area (Broadbent 1980). Only small quantities of groundwater are withdrawn from the deep zone of the principal aquifer because the aquifer is comprised of thin, fine-grained deposits (Maxey and Jameson 1948, Broadbent 1980). The permeability of the principal aquifer is generally greater in the west-central portion of the Las Vegas Valley (Harrill 1976).

3.3.2.3 Groundwater Quality

Groundwater quality in the Las Vegas Valley varies among aquifers. In 14 of 25 shallow monitoring wells in the Las Vegas Valley, the chloride concentration exceeded the Secondary Maximum Contaminant Level of 250 mg/l. While total dissolved solids (TDS) and chloride concentrations are not enforceable drinking water limits, the elevated concentrations of these constituents indicate that shallow groundwater in the Las Vegas Valley has poor taste and aesthetic qualities, and may contribute to scale and fouling of plumbing and water-using appliances (Zikmund, 1996).

Perchlorate has been detected in shallow groundwater that seeps into the southeast end of the Las Vegas Wash. Manufactured for use in rocket fuel, perchlorate is a concern because it has been potentially linked to adverse effects on the thyroid gland and metabolism (EPA 1999, 2003). Perchlorate is not regulated under the Clean Water Act but is on EPA's Contaminant Candidate List for consideration for possible regulation. The Nevada State Health Division has established a public notice standard of 18 parts per billion (ppb). Treatment of the groundwater to reduce the concentrations of perchlorate entering the Las Vegas Wash is on-going. Nitrates, sulfates, and radionuclides were also detected in the shallow and near-surface aquifers (Converse Consultants 2002).

3.3.3 Water Supply and Demand

The description of current and projected supply and demands on water resources are based on the 2004 Water Resource Plan prepared by the SNWA (SNWA 2004). The SNWA periodically reviews and updates the Water Resources Plan, and the 2004 update is the most reliable projection of water demand available for the region.

3.3.3.1 Water Supply

The Las Vegas Valley acquires water from groundwater and surface water. Groundwater accounts for 12 percent of the total annual water supply and is obtained from the principal aquifer located beneath the valley. Approximately 47,000 acre-feet per year (AFY) of groundwater is with-

drawn from the principal aquifer for public water supply in the Las Vegas Valley. These withdrawals occur during the summer to meet seasonal high demand for water. The other 88 percent of the water used in the Valley comes from the Colorado River.

The amount of Colorado River water that is allowed to be withdrawn for use in Nevada is stipulated under a series of interstate agreements and regulatory requirements known as the "Law of the River" (BOR 2004). There are various ways in which water allocation from the Colorado River is determined. Initially, Nevada is allowed a net withdrawal of 300,000 AFY. Secondly, return flow credits take into account discharges to Lake Mead that partially offset withdrawals in Nevada. Water used for indoor purposes generally flows to the sanitary sewer system, is collected, treated, and discharged to the Las Vegas Wash where the water returns to Lake Mead. Because water is returned to the Colorado River system a return flow credit is given to Nevada for the portion of the Las Vegas Wash flow that originated from the Colorado River. For example, if return flow credits are measured at 150,000 acre-feet for a particular year, Nevada would be allowed to withdraw a total of 450,000 acre-feet under the basic apportionment and return flow credit rules.

The third way in which Nevada has access to additional withdrawals is through unused apportionments provided to other states with rights to the Colorado River. When another state does not use all of its allocation of Colorado River water, Nevada can use some or all of the other states unused allocation. The amount of Colorado River withdrawals required by Arizona and California each year is dependent on weather conditions that impact irrigation demand because much of their river withdrawals are used for agricultural irrigation.

The fourth method Nevada can obtain additional water from the Colorado River would be when the Secretary of Interior determines that a surplus condition is expected for the upcoming year. Surplus conditions are typically a function of Colorado River reservoir storage and weather conditions, primarily snowmelt and the resulting runoff in the Upper Colorado River Basin. The current ongoing drought in the Colorado River Basin has reduced the probabilities of surplus water being available to Southern Nevada through 2016 (SNWA 2004c).

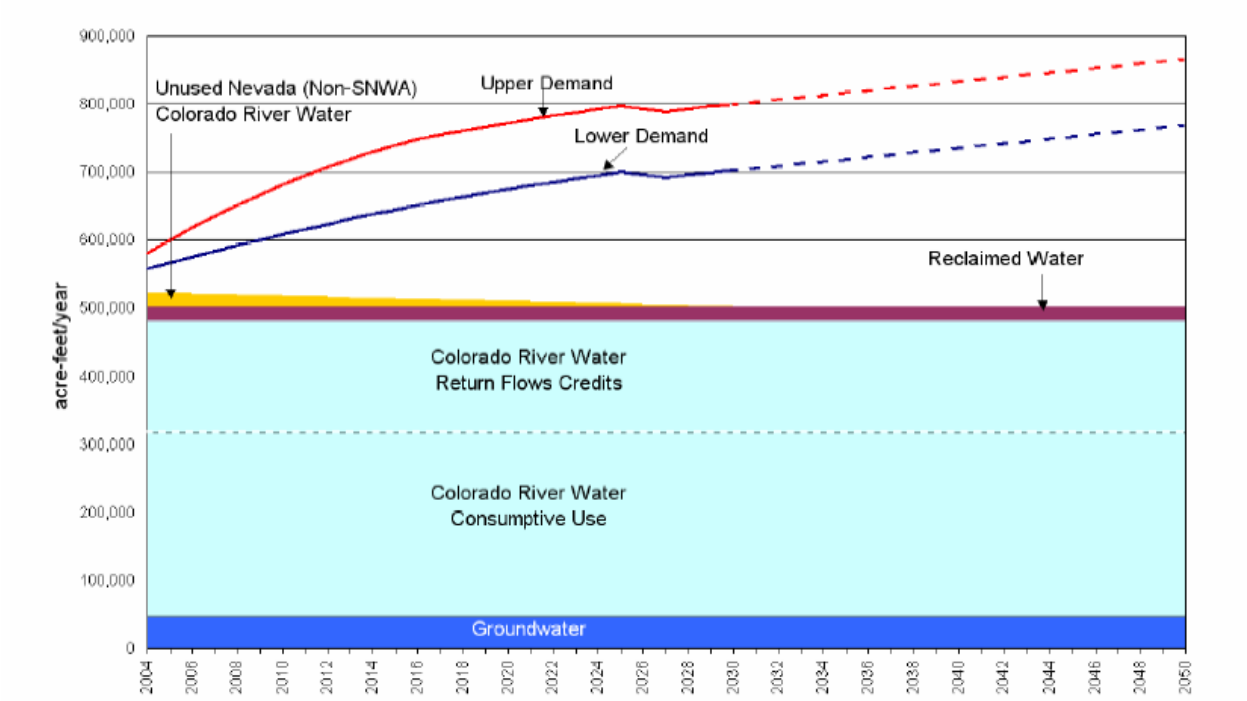
The SNWA currently acquires approximately 500,000 AFY of water from Southern Nevada's Colorado River allocation and associated return-flow credits, unused Nevada Colorado River apportionment, reclaimed water, and Las Vegas Valley groundwater rights (Figure 3.3-4).

3.3.3.2 Demand Projections

Water demand forecasting is based on both population projections and assumed conservation. The SNWA plan establishes a range of possible water demands based on the upper and lower demand forecasts of the long-term water needs of Southern Nevada (Figure 3.3-4). Uncertainties such as future population growth are accounted for by using a range for demand forecasting. The lower demand line reflects the Clark County population projections developed by UNLV in 2000. The upper water demand line shows more rapid water demand growth in the short term, which is consistent with recent demand patterns. The range between the upper and lower demands increases to approximately 100,000 acre-feet by 2018 and remains constant thereafter. Annual water demand is projected to be approximately 660,000 to 760,000 AFY in 2018.

The SNWA is evaluating the legal, engineering, and environmental requirements of developing additional water sources to address future water demand in the region. The near-term planning period includes the 13-year period from 2004 through 2016. To meet the upper range of projected demand, SNWA estimates that during the near-term planning period approximately 2 million acre-feet of additional supply will be required in addition to currently used sources.

Resource options currently available or under development to meet Southern Nevada's water demands have been identified by SNWA. Resource options, not including existing water sources, consist of using previously banked Colorado River water or transfers and exchanges and using various in-state options by obtaining groundwater



Source: SNWA 2004.

FIGURE 3.3-4
WATER SOURCES AND DEMAND FOR SNWA SERVICE AREA

rights outside the Las Vegas Valley. Additional information regarding these resources is available in the SNWA's Water Resource Plan.

3.4 BIOLOGICAL RESOURCES

Biological resources include the native and introduced plants and animals and the vegetative communities in the disposal boundary area. This section provides a description of the special status plant and wildlife species, wetlands, noxious weeds and invasive plant species, and common wildlife.

3.4.1 Vegetation Communities

The Mojave Desert eco-region stretches across portions of southeastern California, northwestern Arizona, southern Nevada, and southwestern Utah and is marked by extreme environmental conditions (Larson 1977). These extreme conditions influence the ecology and species composition in the vegetative communities. Distribution, composition, and density of the vegetation community are strongly influenced by variations in climate, elevation, and soil conditions present in this eco-region. The climate is classified as arid, accompanied by temperatures ranging from 20°F in the winter to more than 100°F during summer months. Overall precipitation is very low, averaging four to six inches per year with erratic rainfall patterns that tend to be localized (Bradley and Deacon 1965). Elevations in the disposal boundary area are characterized as low desert, ranging between 1,500 feet to 1,800 feet above mean sea level (msl). Soil conditions such as alkalinity, salinity, and gypsum content dictate the composition of plant species present in the region.

Vegetative communities in the disposal boundary area include Mojave creosote bush scrub, desert saltbush scrub, and Mojave wash scrub. These vegetative communities commonly occur at low elevations in the Mojave Desert.

The Mojave creosote bush scrub is the most dominant vegetation community in the planning area. The community includes creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), and cactus and yucca species. It is located in well-drained sandy and sandy-loam soils, often on bajadas and low hills and is characterized

by widely spaced shrubs and bushes 2 to 8 feet tall.

The Mojave wash scrub is located throughout the planning area in washes and arroyos. This community includes catclaw acacia (*Acacia greggii*) and desert willow (*Chilopsis linearis*) and is often mixed with the creosote bush scrub community. It is found in sandy beds of wide canyons, incised arroyos of upper bajadas, and in braided, shallow washes of the lower bajadas.

The least dominant community in the planning area is the desert saltbush scrub. This community includes littleleaf saltbush (*Atriplex polycarpa*) and fourwing saltbush (*Atriplex canescens*). It is located in alkali playa habitats with generally moist sandy loam soils with a salinity of 0.2 to 0.7 percent. The little leaf saltbush is dominant in drier soils and co-dominant with fourwing saltbush in moist soils.

3.4.1.1 Wetlands and Riparian Communities

Wetland and riparian communities are considered valuable natural resources that provide habitat for a variety of common and special status plant and wildlife species. Riparian communities are vegetative zones associated with rivers and streams, especially in arid or semi-arid habitats where vegetation and wildlife reach far greater levels of diversity and abundance than in nearby habitats. The riparian community is uncommon in the disposal boundary area, being restricted to areas of perennial and ephemeral streams, storm water run-off channels, and emergent shallow groundwater.

Riparian communities located within the disposal boundary area include the Las Vegas Wash and its tributaries such as Flamingo, Tropicana, and Blue Diamond washes (see Figure 3.3-1). The Clark County Wetlands Park is located outside of the eastern edge of the disposal boundary area downstream along the Las Vegas Wash.

Common riparian vegetation along the Las Vegas Wash channel include common cattail (*Typha latifolia*), pale smartweed (*Polygonum lapathifolium*), common reed (*Phragmites auralus*), giant reed (*Arundo donax*), cocklebur (*Xanthium strumarium*), sacred datura (*Datura meteloides*), yellow nut sedge (*Cyperus esculentus*), and large monotypic concentrations of invasive saltcedar (*Tamarix ramosissima*). Other species known to occur in riparian areas include desert willow (*Chilopsis linearis*), mesquite, and cottonwood (*Populus fremontii*). Upland areas surrounding the Las Vegas Wash include a mix of Mojave creosote bush scrub, Mojave wash scrub, and desert saltbush scrub.

3.4.1.2 Special Status Plant Species

Special status plant species are those that are federally listed threatened or endangered, proposed for listing, or candidates for listing under the Endangered Species Act (ESA). They also include species designated by the BLM as sensitive and those listed or proposed for listing by a state or county in a category implying potential endangerment or extinction. The BLM is mandated to protect and manage threatened, endangered, candidate, proposed, and sensitive plant species and their habitat. The BLM is also required to protect and manage sensitive species jointly identified with the appropriate state agency.

Many special status species in Clark County are also covered under the Clark County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was prepared pursuant to Section 10(a) of the ESA to support the issuance of a Section 10 permit from the U.S. Fish and Wildlife Service (USFWS) for incidental take of federally listed species covered by the MSHCP that would result from otherwise lawful activities on non-federal properties within the county (Clark County 2000). As signatories to the MSHCP, Clark County in cooperation with several federal, state, and local agencies are responsible for long-term protection and management of the MSHCP-covered species and their habitats. A list of the species covered by the MSHCP is in Appendix B.

Special status plant species known to occur within the disposal boundary are listed in Table 3.4-1. Field surveys were performed to identify occurrences of these plant species in the disposal boundary area. Figure 3.4-1 shows where these plant species were identified during the field surveys.

TABLE 3.4-1
SPECIAL STATUS PLANT SPECIES WITHIN THE DISPOSAL BOUNDARY AREA

Scientific Name	Common Name	BLM Sensitive	State of Nevada	MSHCP Covered
Arctomecon californica	Las Vegas bearpoppy	Yes	CE	Yes
Eriogonum corymbosum	Las Vegas buckwheat	Yes	No	No
Penstemon bicolor	Two-tone penstemon	Yes	CE#	No

CE State of Nevada Critically Endangered (NRS 527.270)
CE# Candidate for State of Nevada Critically Endangered
Source: Clark County 2000, NNHP 2002, and USFWS 2003.

Federal Threatened and Endangered Plant Species

A list of species threatened, endangered, or proposed for listing was provided by the U.S. Fish and Wildlife Service (USFWS) on November 12, 2003. According to the USFWS there are no federally listed threatened, endangered, or candidate plant species, or USFWS plant species of concern known to occur within the disposal boundary area (USFWS 2003). A copy of the letter is included in Appendix B.

BLM Sensitive and State of Nevada Protected Plant Species

There are three BLM Sensitive Plant Species known to occur within the disposal boundary area (see Table 3.4-1). Two of those are also protected by the State of Nevada.

Las Vegas bearpoppy is endemic to the northeastern Mojave Desert eco-region and the majority of the populations occur in Clark County, Nevada. Several small populations and one very large population occur in northwest Arizona. Distribution of the species is patchy, scattered across low "badland" hills and sometimes on ridges and benches associated with gypsum soils, which is the limiting factor for growth. Small bunches of bearpoppy communities are common in favorable soil conditions. These communities occur primarily in the northern portion of the disposal boundary area, which is an area with known gypsum soil attributes. Potential bearpoppy habitat and distribution was estimated using a 50-foot buffer around each occurrence documented during field surveys. The buffer was used to account for seed dispersal in the surrounding soils with suitable habitat. Approximately 60 acres of bearpoppy and related habitat are present within the disposal boundary area (see Figure 3.4-1). A permit is needed from the Nevada Division of Forestry to remove bearpoppy from federal, state, or county lands or from private lands without permission.

Las Vegas buckwheat occurs in desert scrub habitat in small concentrations, usually along washes, rocky slopes and outcrops, or on flats. Buckwheat populations are usually associated with clayish-gypsum soils at an elevation between 1,000 to 3,500 feet above msl. The Las Valley buckwheat is currently being evaluated for listing as a State of Nevada Critically Endangered Species. The ecology of the species is still under scientific study and research. Similar to the Las Vegas bearpoppy, distribution and community density occurs largely on gypsum soils and are commonly associated with bearpoppy communities. Potential buckwheat habitat and distribution was estimated using a 100-foot buffer around each occurrence documented during field surveys. The distribution of buckwheat was more concentrated and abundant than the bearpoppy; therefore an expanded buffer of 100 feet was used to account for seed dispersal and suitable surrounding habitat. Figure 3.4-1 shows the distribution of Las Vegas buckwheat populations found during field surveys which amounts to approximately 400 acres.

Two-tone penstemon is a probable Nevada endemic with 31 mapped occurrences in Clark County. The penstemon occurs in a variety of habitats associated with slightly elevated spring rain runoff. The two-tone penstemon is listed by two distinct subspecies; the sub-species bicolor (yellow twotone beardtongue) and the roseus (rosy twotone beardtongue), both are listed as BLM Sensitive Plant Species. The subspecies

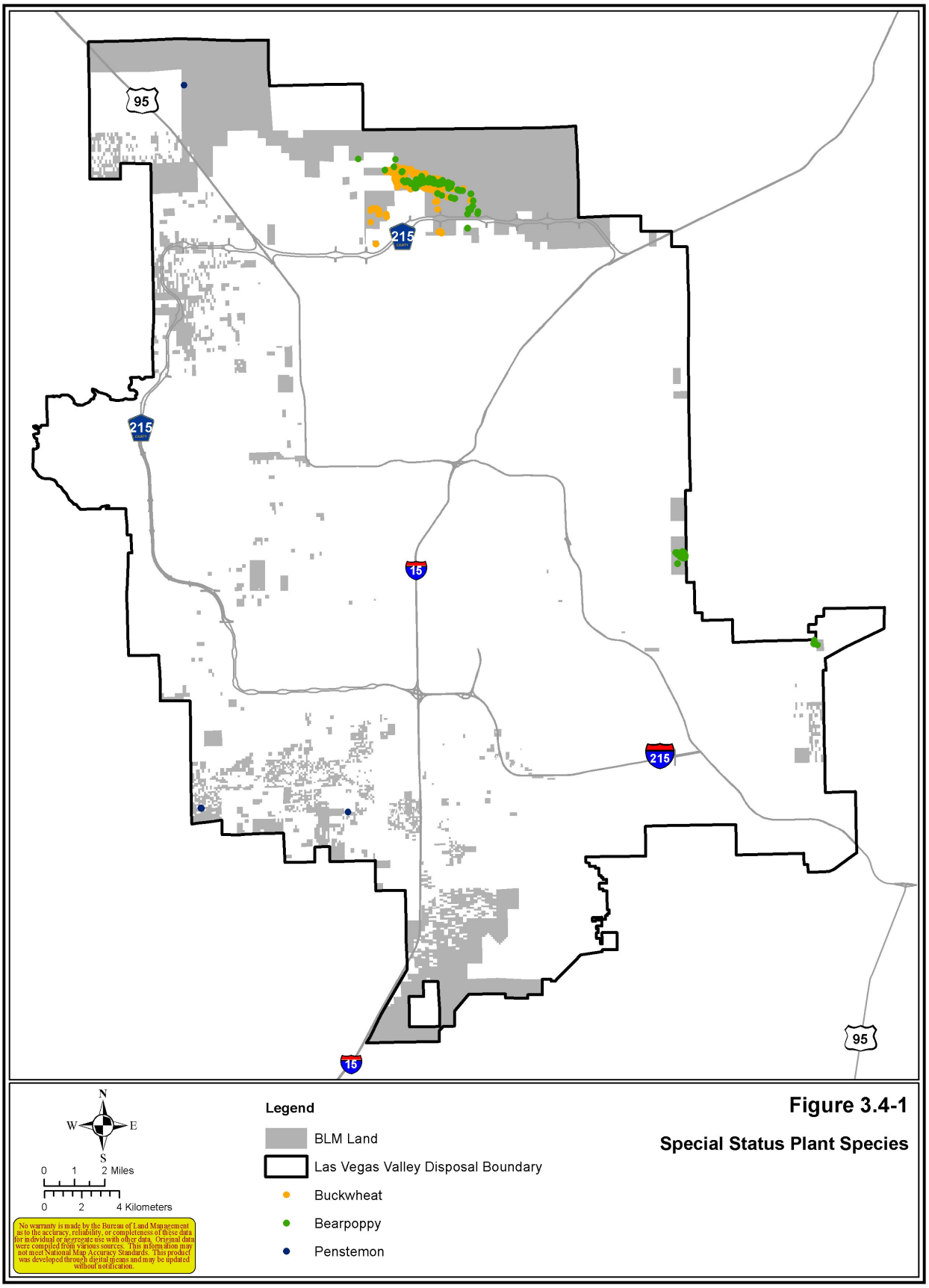


Figure 3.4-1

Special Status Plant Species

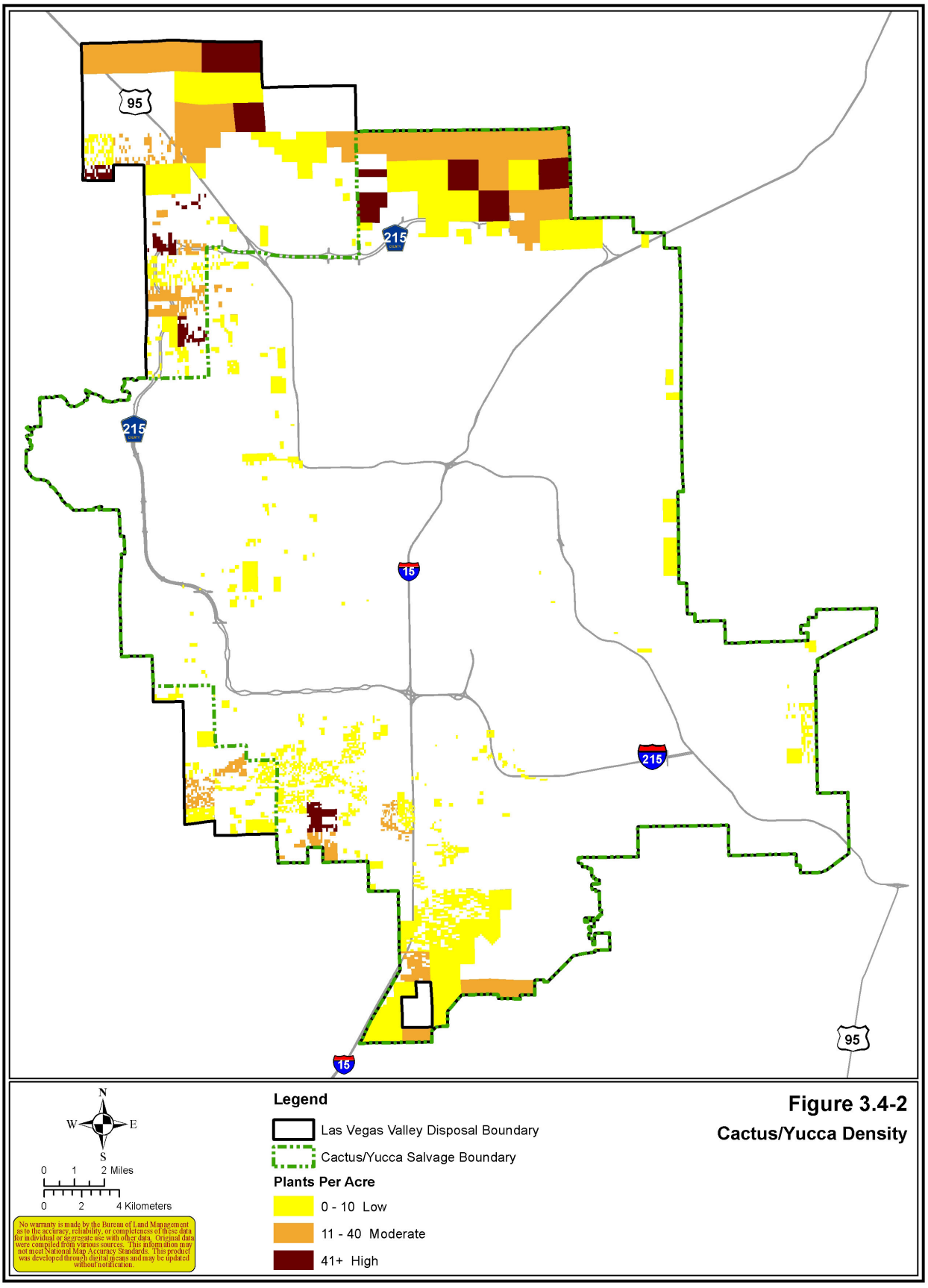


Figure 3.4-2
Cactus/Yucca Density

bicolor usually occurs at an elevation range from 2,500 to 5,480 feet above msl and the subspecies roseus usually occurs at an elevation range from 1,800 to 4,840 feet above msl. For the purposes of this EIS, the two subspecies were not segregated during field surveys and all plants mapped were recorded as penstemon bicolor. The two-tone penstemon populations are known to occur at three sites with limited numbers within the disposal boundary (see Figure 3.4-1).

Nevada State Protected Cacti, Yuccas, and Conifers

All native cacti, yuccas, and evergreen trees are protected and regulated by the State of Nevada under Nevada Revised Statute (NRS) 527.060-.120. This provision does not allow the removal or destruction of the listed plant species on Nevada state lands, county lands, reserved or unreserved lands owned by the federal government, and from privately owned lands without written permission, permit and/or tag issued by the Nevada Division of Forestry.

Cacti were encountered infrequently and at low densities during the biological field surveys. Cacti species observed include cottontop cactus (*Echinocactus polycephalus* var. *polycephalus*), pencil cholla (*Opuntia ramosissima*), barrel cactus (*Ferocactus cylindraceus*), beavertail cactus (*Opuntia basilaris* var. *basilaris*), and silver cholla (*Opuntia echinocarpa*). Relative densities of cacti and yucca per acre were determined based on visual observations of the BLM lands surveyed. Figure 3.4-2 shows the densities determined during field surveys. The salvage boundary shown on the figure depicts the area from which the BLM determines if salvage of cacti and yuccas would be necessary as mitigation for surface disturbing activities.

Acacia/Mesquite Complex

Two plant species of concern known to occur within the disposal boundary area are the catclaw acacia (*Acacia greggii*) and mesquite (*Prosopis glandulosa*). Although these plant species are not federally or state listed for protection, the catclaw acacia and mesquite habitat support populations of phainopepla, a BLM listed sensitive bird species. Small scattered stands or bosques grow in ephemeral drainages along the Las Vegas Wash and tributaries and throughout other riparian corridors within the disposal boundary area. During field surveys bosque locations, plant species, and densities were recorded. The highest plant densities of these bosques occur around the Las Vegas Wash in the northern portion of the disposal boundary area and around Duck Creek Wash located in the southeastern part of the area (see Figure 3.4-3).

3.4.1.3 Noxious Weeds and Invasive Species

Federal agencies are directed by Executive Order 13112, Invasive Species to expand and coordinate efforts to prevent the introduction and spread of invasive plant species (noxious weeds) and to minimize the economic, ecological, and human health impacts that invasive species may cause. Weed management is an integral part of maintaining ecosystem health. A noxious weed is generally destructive and difficult to control or eradicate. A list of noxious weed species that are known to occur within the disposal boundary area is included in Appendix B.

Saltcedar (*Tamarisk* ssp.) was the most dominant invasive plant species found in the disposal boundary area during field surveys. The majority of the plants was found throughout the Las Vegas Wash and related tributaries. Saltcedar poses an ecological threat to the native plant community composition, density, and spatial relationship. The plant has a long tap root that allows them to intercept deep water tables and interfere with natural aquatic systems.

3.4.2 Wildlife

The BLM parcels within the disposal boundary contain a variety of habitats that support numerous species of wildlife. The term "wildlife" refers collectively to mammals, birds, fish, amphibians, and reptiles. Common wildlife in the disposal boundary have adapted to changing habitat conditions and urban surroundings that exist throughout the disposal boundary area. The BLM lands vary from parcel to parcel but are primarily undeveloped lands. The larger contiguous lands in the northern and southern parts of the disposal boundary area provide habitat for wildlife and some of the scattered, larger parcels contain fragmented

TABLE 3.4-2
SPECIAL STATUS WILDLIFE SPECIES WITHIN THE DISPOSAL BOUNDARY

Scientific Name	Common Name	Federal	BLM Sensitive	State of Nevada	MSHCP Covered
Aves					
Haliaeetus leucocephalus	Bald eagle	T	Yes	Yes	No
Athene cunicularia	Western burrowing owl	No	Yes	Yes	No
Phainopepla nitens	Phainopepla	No	Yes	No	Yes
Falco peregrinus anatum	American peregrine falcon	No	Yes	No	Yes
Mammals					
Euderma maculatum	Spotted bat	No	Yes	Yes	No
Ovis Canadensis nelsoni	Desert bighorn sheep	No	Yes	No	No
Reptiles					
Gopherus agassizii	Desert tortoise (Mojave)	T	Yes	Yes	Yes
Sauromalus obsesus	Western chuckwalla	No	Yes	No	Yes
Heloderma suspectum cinctum	Banded Gila monster	No	Yes	Yes	No

T= Threatened
Source: Clark County 2000, NNHP 2002, LVWCC 2002, NPS 2002, and SWCA 2000.

habitat that supports wildlife. Species-specific surveys were not conducted for common wildlife within the disposal boundary area; however, assumptions can be made from current vegetation, surrounding conditions, and historical documents and literature review for wildlife that may occur. Additionally, several bird surveys have been conducted previously along the Las Vegas Wash and in portions of the disposal boundary area. Common wildlife species known to occur in the disposal boundary area are included in Appendix B.

3.4.2.1 Special Status Wildlife Species

Special status wildlife species are similarly defined as special status plant species. It includes species that are federally listed threatened or endangered, proposed for listing, or candidate for listing under the ESA, species designated by the BLM as sensitive, and those listed or proposed for listing by a state or county in a category implying potential endangerment or extinction. Table 3.4-2 provides a list of special status wildlife species that are known to occur within or near the disposal boundary area.

Federal Threatened and Endangered Species

The list of species federally threatened, endangered, or proposed for listing provided by the U.S. Fish and Wildlife Service (USFWS) on November 12, 2003 indicated two threatened species are known to occur within the disposal boundary area (USFWS 2003). The species include the bald eagle and the desert tortoise.

The bald eagle frequents estuaries, large lakes, reservoirs, major rivers, and some seacoast habitats. However, such areas must have an adequate food base, perching areas, and nesting sites to support bald eagles. The birds often congregate at specific wintering sites that are generally close to open water and that offer good perch trees and night roosts. The bald eagle was proposed for delisting in 1999 but still receives full protection under the ESA. Habitat to support the bald eagle does not exist within the disposal boundary area and no birds were sighted during field surveys. However, the bald eagle is known to be an occasional migrant through the disposal boundary area.

The desert tortoise (Mojave population) was listed as threatened in 1990. In the Mojave Desert the tortoise occurs in Mojave creosote bush scrub, creosote bursage complex, shadscale scrub, and occasionally in mixed blackbush scrub usually between 3,500 and 5,000 feet above msl. The desert tortoise primarily forages on annual wild

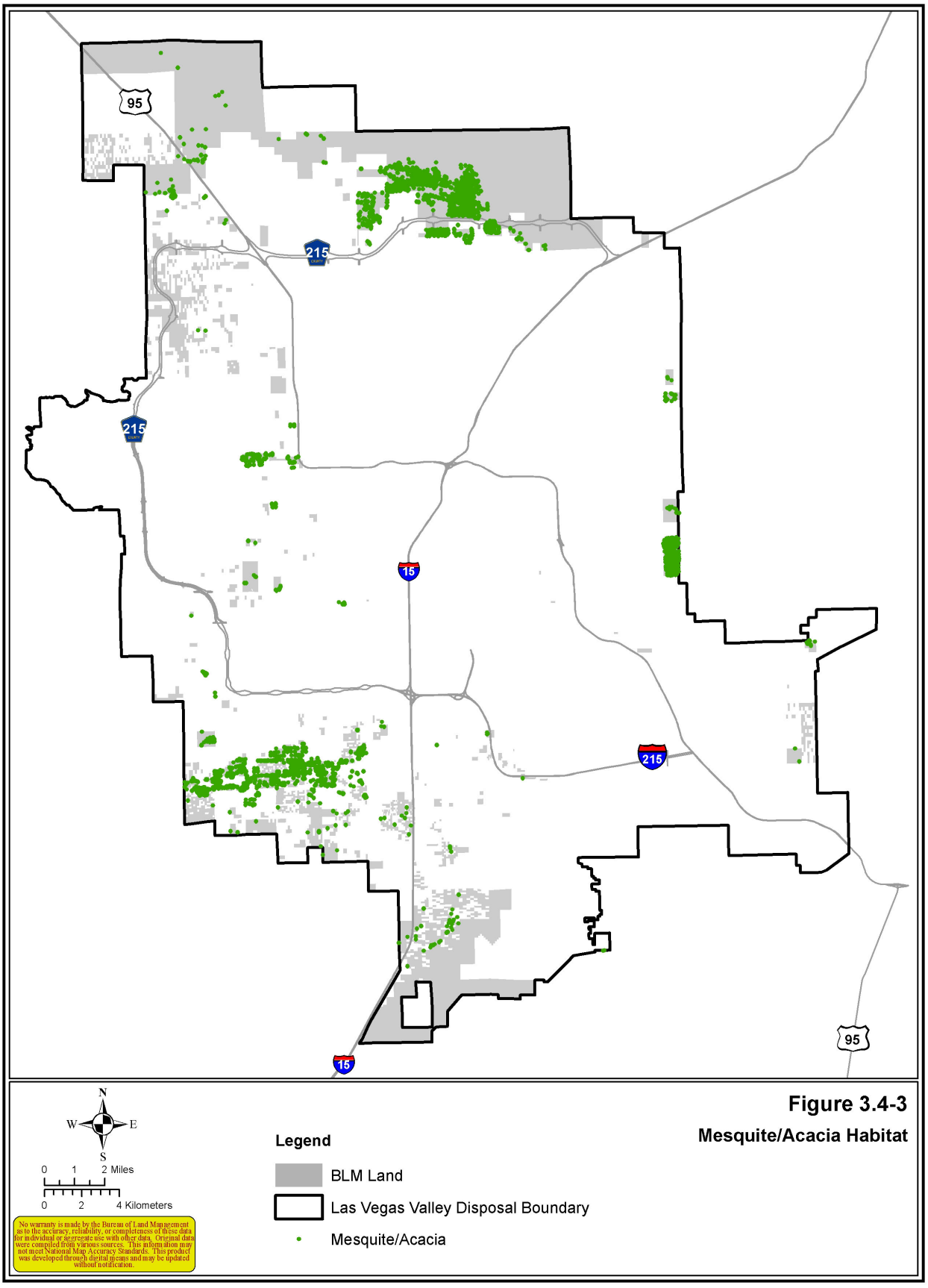


Figure 3.4-3
Mesquite/Acacia Habitat

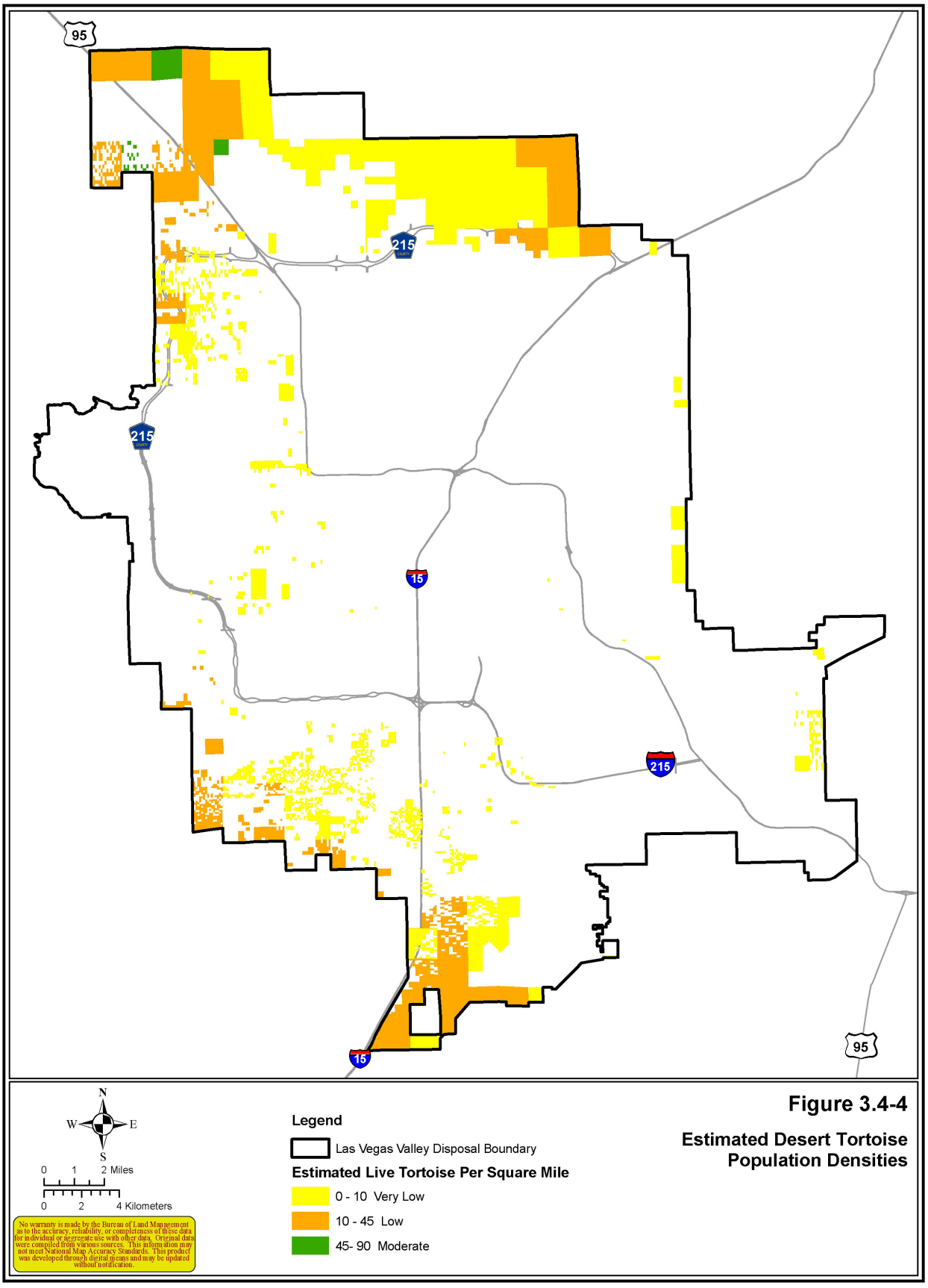


Figure 3.4-4

Estimated Desert Tortoise Population Densities

flowers and native desert grasses, especially galleta and Indian rice grass. There is no designated critical habitat for the tortoise within the disposal boundary area. An estimated 41,500 acres of potential habitat were surveyed within the disposal boundary area for desert tortoise sign. Tortoise sign recorded and mapped included live tortoises, tortoise carcasses, burrows, scat, tracks, and courtship rings. Relative densities were quantified based upon corrected-sign-per-acre according to estimates developed by the Las Vegas BLM for the Nevada Range (Karl 1980, Berry and Nicholson 1984). Tortoise densities in the project area are shown on Figure 3.4-4. Higher densities were recorded in the northern and southern parts of the disposal boundary area where the most suitable desert tortoise habitat exists.

BLM Sensitive and State of Nevada Protected Wildlife Species

There are eight BLM sensitive wildlife species (not including federal threatened species) known to occur within the disposal boundary area; three of these species are also protected by the State of Nevada (see Table 3.4-2). Sensitive species noted during the field surveys included the phainopepla, American peregrine falcon, and western burrowing owl. Although these species were documented throughout the disposal boundary area, the majority were located in the northern part of the area. Skeletal remains of a desert bighorn sheep were found in the northern portion of the disposal boundary area

Migratory Birds

Most birds are protected by the Migratory Bird Treaty Act (MBTA). Breeding and sustainable habitat for migratory birds within the disposal boundary area has been degraded to varying degrees due to surface disturbance and fragmentation. Historically, approximately 150 migratory birds have been recorded within and adjacent to the disposal boundary area with the highest diversity found along the Las Vegas Wash. During the field surveys, notable migratory birds including the American peregrine falcon, western burrowing owl, phainopepla, and common dove were identified in and adjacent to the project area.

3.5 CULTURAL RESOURCES

Cultural resources are prehistoric and historic archaeological sites, districts, structures, or locations considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other reasons. Prehistoric archaeological resources may include rock shelters, lithic scatters, flaked stone scatters, rock rings or alignments, tool procurement sites, thermal features/roasting pits with artifact scatters, and rock art locations. Historic sites may include buildings, structures, features such as mine shafts or adits, transportation routes, and refuse deposits.

The information in this section is based on BLM Report 5-2467, An Archeological Survey for the Las Vegas Valley Disposal Boundary Environmental Impact Statement, Clark County, Nevada, May 2004.

3.5.1 Overview

An overview of the cultural resources of the Las Vegas Valley includes a description of the prehistoric period, historic period, and a brief summary of previous investigations of the area.

3.5.1.1 Prehistoric Period

The archaeological record of southern Nevada documents human use of this region beginning about 12,000 years ago. The cultural history of the Las Vegas Valley is subdivided into four major periods: Paleo-Archaic (10000-5500 B.C.), Archaic (5500 B.C.-A.D. 500), Ceramic (A.D. 500-1540), and Historic (A.D. 1540-1950). The first three periods deal with Native American prehistory and the fourth period covers both Native American and Euro-American history.

Two artifact traditions are generally distinguished within the Paleo-Archaic period: the Fluted Point (Paleo-Indian) and the Stemmed Point (Lake Mojave). The most characteristic artifact of the Fluted Point tradition is the large distinctive Clovis point. These points may have had a variety of uses but in southern Nevada, at least, some were hafted to thrusting spears. These hunting weapons were used to kill mammoths, other large

mammals, or megafauna that later became extinct. Fluted points have been recorded primarily as isolates throughout the Great Basin. None have been found in association with extinct megafauna. The Great Basin Stemmed Point tradition was first recognized in the 1930s at sites located on the shores of Pleistocene Lake Mojave, California. The sites yielded Lake Mojave and Silver Lake projectile points and other distinctive stone artifacts called crescents. The Fluted and Stemmed Point traditions are not well represented in southern Nevada though stemmed points have been recovered from a site near Jean Lake, southeast of Goodsprings and from a site located along California Wash, to the northeast of Las Vegas.

The Archaic tradition is characterized by a broad-spectrum adaptation to the animal and plant resources of a Holocene environment that resembled the historic and modern-day environment. Characteristic artifacts of the Middle Archaic (5500-3000 B.C.) and Late Archaic (3000 B.C.-A.D. 500) periods include large projectile points that would have been hafted to darts that were propelled with atlatls. Grinding tools appear to be an important part of tool assemblages dating to the Middle Archaic, and they are common in Late Archaic assemblages. The Middle Archaic has also been called the Pinto period in reference to the Pinto point, and the Late Archaic has been called the Gypsum period in reference to the Gypsum point.

The introduction of the bow and arrow and the adoption of pottery for cooking and storage mark the beginning of the Ceramic period (A.D. 500-1540). The replacement of lightweight basketry with heavier ceramic containers was typically associated with a farming economy and greater sedentism. Pottery often forms the basis for defining prehistoric archaeological cultures because pottery types vary from region to region and correlate with other traits such as architecture and settlement patterns. The Las Vegas Valley straddles the boundary between the Virgin Branch of the Anasazi and Patayan or Lower Colorado River culture areas. The ceramic assemblages from various sites in the Valley frequently contain equal numbers of Patayan and Virgin Anasazi ceramics, with Southern Paiute Brown Ware sherds also well represented. Ceramic data suggest that the inhabitants of the Las Vegas Valley were in contact with Anasazi groups to the east. Paiute ceramics first appeared in the Las Vegas Valley during A.D. 1000-1500. There is no evidence that Anasazi and Patayan peoples ever crossed paths within the Las Vegas Valley.

3.5.1.2 Historic Period

When Euro-Americans first penetrated southern Nevada it was occupied by related bands of Numic people, the Southern Paiute, and the Chemehuevi, who practiced a mixed economy based on foraging and gardening. Subsistence partners in the Las Vegas Valley might have resembled accounts of the Paiutes in southern Utah. The Dominguez-Escalante Expedition of 1776 reported Paiutes planting corn, wheat, and squash in irrigated patches of land located near creeks. By 1855, when the first non-Indian settlers arrived in the Las Vegas Valley, the dislocation of the Paiutes from their traditional campgrounds and gardens along Las Vegas Creek was accomplished without violence.

Euro-American explorers, traders, and trappers passed through southern Nevada seeking a feasible route from the Rocky and Wasatch mountains to California. Not until 1826, Jed Smith and other fur trappers began to probe the region for a route to the southern California coast, was there direct contact between these Euro-Americans and the Southern Paiutes. Antonio Armijo, a merchant from Santa Fe led the first commercial caravan to reach Los Angeles in 1829. His success spurred the development of the Old Spanish Trail. However, in 1844 John C. Fremont is credited with leading the first group to cross through the Las Vegas Valley, popularizing the Old Spanish Trail through southern Nevada and across the Spring Mountains to the Amargosa River. This route was the basis for the subsequent Mormon Road of the mid-to-late 19th century (Myhrer, White and Rolf, 1990).

Members of the Church of Jesus Christ of Latter Day Saints, known as Mormons, made the first attempt to settle Las Vegas in 1855. Journals kept by Mormon settlers and explorers suggested that they explored Las Vegas Wash on their journeys to the Colorado River. In 1855, Brigham Young

sent a company of approximately 30 men to Las Vegas to teach the gospel to the Indians and to establish a halfway station between Mormon settlements in Utah and California. The missionaries built a small adobe fort along Las Vegas Wash near what is now the intersection of Las Vegas Boulevard and Washington Avenue.

The San Pedro, Los Angeles and Salt Lake Railroad was formed in 1901. Construction of the grade was completed to Las Vegas in 1904 on the northern end and to Jean on the southern end. Passenger service began in May 1905. During 1930-1931, the Boulder City branch was constructed in order to haul supplies to the Hoover Dam construction site. Las Vegas remained primarily a railroad town until 1930 when construction of Hoover Dam contributed to its economy and settlement.

Congress passed the Boulder Canyon Project Act in 1928 to support construction of a dam on the Colorado River. The Hoover Dam project attracted workers and families from across the country. The legalization of gaming in 1931 and the advent of World War II added to the booming population of Las Vegas. What is now Nellis Air Force Base opened in 1941 to train pilots and Basic Magnesium built a refinery in Henderson to supply the army with magnesium for incendiary bombs. A Moving Target Range was built in 1942-1943 for the Las Vegas Army Gunnery School. This range was part of the first aerial gunnery school established in the U.S. World War I ace, Martinus Stenseth, oversaw the creation of this new school and the development of new methods for teaching aerial gunnery skills. The gunnery school trained 25,000 airmen during World War II to shoot down enemy planes.

3.5.1.3 Previous Archaeological Investigations

A number of previous investigations for cultural resources have been conducted in the Las Vegas Valley. Pioneer archaeologists Malcolm Rogers of the San Diego Museum of Man and Mark Harrington of the Heye Foundation and later the Southwest Museum first defined the major cultural periods of the Mohave Desert region, including southern Nevada. Rogers is best known for his definition of the three major cultural periods in the Mojave Desert—the San Dieguito, the Amargosa, and the Yuman periods. Harrington is known for his work directing the Civilian Conservation Corps excavations of Lost City prior to the site's inundation by Lake Mead, as well as for his search for Pleistocene remains at Tule Springs and Gypsum Cave. Harrington's work in North Las Vegas at Tule Springs in the 1960s led to an expedition to search for pre-Clovis man. This large expedition directed by Richard Shutler identified evidence of man's presence in the region about 10,000 years ago.

Research in the Las Vegas Valley between 1970 and 1990 was primarily development driven. Some of the larger projects of this period included the Navajo McCullough transmission line project, Bureau of Reclamation's Las Vegas Wash Desalination project, and a large multi-year survey sponsored by the Nevada Division of Historic Preservation and Archaeology. These and many other projects documented the use by the valley's prehistoric inhabitants of campsites, located both in rock shelters and in open settings, and of resource-procurement sites.

3.5.2 Archaeological Survey and Results

HRA, Inc. Conservation Archaeology completed a comprehensive review of archaeology site files and conducted a Class III field inventory of the disposal boundary area from September 2003 through May 2004. Records were reviewed at the Harry Reid Center for Environmental Studies, Barrick Museum of Natural History, University of Nevada, Las Vegas (UNLV); Lied Library, Special Collections, UNLV; and the BLM Las Vegas Field Office. An Archaeological Research Design was prepared to guide the Class III inventory and to develop the historic context for making recommendations for site eligibility to the National Register of Historic Places (NRHP). A site was defined in the Research Design as at least 10 artifacts within a 10 meter diameter area, except when all pieces appeared to originate from a single source such as one ceramic pot, a glass bottle, or a single stone tool. The BLM lands that had not been surveyed in the last 10 years were included in this survey.

TABLE 3.5-1
TYPES OF SITES / FEATURES RECORDED

Prehistoric	
Archaic lithic scatter	Prehistoric camps
Ceramic scatter	Rock alignments/rings/shelters
Fire-affected rock/ash/charcoal	Thermal rock features
Lithic procurement sites/scatter	Flaked stone scatter
Artifact scatters with thermal features	Trail segments with rock features/cairns
Historic	
Bard siding of the Union Pacific Railroad	Historic camps/artifact scatters
Arden segment of the Union Pacific Railroad	Las Vegas-Bullfrog/Tonopah Wagon Road
Arden to Shoofly railroad grade	Roads/pipeline ditch
Las Vegas to Tonopah railroad grade	Tule Springs Expedition Campsite
Blue Diamond railroad grade	Modern petroglyph site (rock art)
Tule Siding of the Las Vegas to Tonopah railroad	Spreader dyke feature
Railroad construction camp	Portions of the Arden Plaster Mine
Aerial targets/camps associated with Nellis Air Force Base	Trash/can scatters

The records review found 117 previously recorded archaeological sites on the BLM lands within the disposal boundary area, of which 31 sites were relocated during the field survey. The previously recorded sites that could not be relocated were isolated occurrences (artifacts) or small artifact scatters that do not qualify as sites under the definition used in the Research Design. Of the 86 sites that could not be relocated, seven sites had been recommended as eligible for inclusion on the NRHP and 69 sites were not eligible. Data recovery had been conducted at five of the seven sites that had been recommended as eligible.

Archaeologists identified 100 sites on the BLM lands within the disposal boundary area during the Class III field inventory. This included 31 sites that had been previously recorded (including the Tule Springs National Register Site) and 69 unrecorded (new) sites. Fifty-eight of the sites are considered prehistoric and 42 are historic. The types of sites recorded are shown in Table 3.5-1. Most of the historic sites are associated with a railroad or a road that passed through the Las Vegas Valley.

3.5.2.1 Sites Determined Eligible for the National Register of Historic Places

The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. It is a list of districts, sites, buildings, structures, and objects found significant to American history, architecture, archeology, engineering, and culture. National Register properties have significance to the prehistory or history of a community, state, tribe, or the Nation.

The National Register Criteria for Evaluation are standards for evaluating the significance of a site to determine if it qualifies for the NRHP. The evaluation criteria are applied to sites that possess integrity of location, design, setting, materials, workmanship, feeling, and association and are:

- Associated with events that have made a significant contribution to the broad patterns of history (Criterion A),
- Associated with the lives of persons significant in the past (Criterion B),
- Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic values; or represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C),
- Yielded or may be likely to yield information important in prehistory or history (Criterion D).

The BLM has determined that four historic and five prehistoric sites located on BLM lands within the disposal boundary area are eligible for listing on the NRHP. The historic sites include two re-recorded military installations, the Tule siding for the Las Vegas to Tonopah Railroad, and a historic road segment associated with the Las Vegas-Bullfrog/Tonopah wagon road. The prehistoric sites include flaked and ground stone with a rock shelter, two thermal rock features (one with charcoal and flake and one with subsurface deposit and ceramics), and flaked stone scatter. The BLM consulted with the Nevada State Historic Preservation Officer (SHPO) regarding these eligibility determinations. The SHPO concurred with the BLM via letter dated August 6, 2004 that the nine sites are eligible for the NRHP (see Appendix F).

3.5.2.2 Sites Listed on the National Register of Historic Places

The Tule Springs National Register Site (26CK244-248) is the only site listed on the NRHP located on BLM lands within the disposal boundary area. The Tule Springs site covers approximately 960 acres across the Upper Las Vegas Wash in the northern part of the Las Vegas Valley. Approximately 660 acres of the site are on BLM lands within the disposal boundary area and the remaining acres are on State lands.

The Tule Springs site was first discovered in 1933 during a paleontology expedition by the American Museum of Natural History. It was nominated to the NRHP in 1972 for its significant role in the history of American archaeology (Criterion A) and its role in American science because of its association with Willard F. Libby, who invented radiocarbon dating (Criterion B). Tule Springs is the site Libby chose to test his radiocarbon dating during the famous archeological dig conducted in 1962 and 1963. At the time, Tule Springs was the best candidate site to determine if early man and Pleistocene fauna were contemporaneous but the claim that artifacts were associated with extinct fauna could not be substantiated. Tule Springs has produced substantial data relevant to the Great Basin's late Pleistocene environmental history and evidence of man's presence during the Paleoindian period (10000-11500 BP).

There were four isolated artifacts and one site, the Tule Springs Expedition Base Camp, recorded during surveys performed at the Tule Springs site for the land disposal action. The isolated artifacts include a white chert biface thinning flake, obsidian Pinto point, quartzite scrapper, and quartzite flake.

3.6 NATIVE AMERICAN RESOURCES

Native American resources include locations associated with the traditional beliefs and events of Native American groups regarding their origin, cultural history, religion, or nature of the world. A culturally significant area is a location that is valued by an ethnic group because it is an important place in the traditional cultural landscape. Often identified by Native Americans, these areas include places that figure prominently in their religion or oral tradition, such as sacred mountains or springs where important events took place in the legendary past. A Traditional Cultural Property (TCP) is an area of traditional importance that has been determined eligible for listing or has been listed on the NRHP based on established definitions and criteria.

The information in this section is based on the Ethnographic Assessment for the Las Vegas Valley Land Disposal Project, Clark County, Nevada, June 2004.

3.6.1 Native American Tribes

Many Native American people have inhabited or migrated through the general vicinity of the Las Vegas Valley. The first people were those that archaeologists refer to as Paleoindian, Archaic, Patayan, and Virgin Anasazi. At the time of European contact, Native Americans inhabiting the general area were the Southern Paiute and Mojave.

The most recent Native American inhabitants of the Las Vegas Valley are the Southern Paiutes, including the Chemehuevi. These Numic-speaking people were hunter-gatherers who migrated on a seasonal basis within particular band territories. The Southern Paiutes who lived in

what is now the Las Vegas Valley were called *Nipakanticimi* (people of Charleston Peak) or *Tudinu* and lived in a relatively large region bounded roughly on the east by the Mojave Desert and Amargosa River in California and on the west by the Colorado River. The Chemehuevi, also Southern Paiutes, lived within this same area. (Bengston 2004) The Mojave have lived in the Colorado River Valley since at least the 11th or 12th century. The aboriginal territory of the Mojave extended along both sides of the Colorado River in sprawling settlements from the northern end of Lake Mohave south to the southern end of the present day Colorado River Indian Reservation. The Mojave depended on farming for subsistence. (Bengston 2004)

The Hualapai and Hopi are not known to have physically inhabited the Las Vegas Valley but may have cultural ties to the area because of its proximity to the Colorado River. The Hualapai, a Yuman-speaking people, once inhabited an area of more than five million acres in what is now northeastern Arizona. The Hualapai were dependent on seasonal hunting and gathering. Hopi inhabit and practice agriculture on lands located on the southern escarpment of Black Mesa in northeastern Arizona. Although their primary areas of settlement are the mesas in the center of their present day reservation, the Hopi have rich oral traditions that tell of Hopi clan migrations throughout the Southwest. (Bengston 2004)

3.6.2 Culturally Significant Areas

The Las Vegas Valley was a favored camping area because of its many springs and its proximity to the Colorado River. According to evidence from historical documents, the Las Vegas area was shared by many regional Native Americans on a cooperative basis and not considered the property or territory of any single group. There were several named Southern Paiute villages and garden farm sites located next to prominent ranches and springs within the Las Vegas Valley (Bengston 2004). The habitation sites listed in Table 3.6-1 are likely located within the disposal boundary area.

Archival and literature reviews identified a number of other areas (see Table 3.6-2) in the Las Vegas Valley as being culturally significant to Native Americans. Most of the sites are located outside the disposal boundary area. The Sloan Canyon Petroglyphs site is listed on the NRHP and considered a TCP, whereas Gypsum Cave and Lake Las Vegas Intaglio are eligible for listing on the NRHP but their eligibility as TCPs has not been evaluated.

3.6.3 Native American Consultation

The BLM consults with Native American tribes to identify their cultural values, religious beliefs, and traditional practices that may be affected by a BLM action. This includes the identification of physical locations that may be of traditional cultural or historical importance to the tribes. Historic properties of religious or cultural significance to Native American tribes may be located on ancestral, aboriginal, or ceded lands of that tribe. Thus, BLM also identifies tribes that claim cultural affiliation with the Las Vegas Valley but now live at great distances from the area.

The term "tribe" in the National Historic Preservation Act (NHPA) refers only to federally recognized tribes as listed by the Bureau of Indian Affairs. Accordingly, only a federally recognized tribe has the right to participate in Section 106 consultation but the BLM consults with all tribes that may be affected. The 15 tribes listed in Table 3.6-3 were contacted by the BLM for input regarding the land disposal action, including the Pahrump Paiute Tribe which is not a federally recognized tribe.

None of the tribes contacted provided any comments regarding the significance of the villages and garden sites, or the culturally significant places listed in the above tables. The tribes did not identify any additional culturally significant places within the disposal boundary area (Bengston 2004).

TABLE 3.6-1
SOUTHERN PAIUTE VILLAGE AND GARDEN FARM SITES IN LAS VEGAS VALLEY

Aivarɷna (Wilson's Ranch)	Wipi (north of Las Vegas)
Kwaint]imit (Old Taylor Ranch)	Pitánɷnkwapits (Jap Ranch)
Wɷya (Stewart Ranch)	Las Vegas Oasis
Parɷmpaiya or Akávapɷ (Stewart Ranch)	Lorenzi Park
Titsívas or Dembesaapah (Tule Springs area)	

Source: Bengston 2004

TABLE 3.6-2
OTHER CULTURALLY SIGNIFICANT AREAS IN LAS VEGAS VALLEY

Sloan Canyon Petroglyphs[1]	Black Hills[1]	Frenchman/Sunrise Mountain[1]
Railroad Pass[1]	Spring Mountains[1]	Las Vegas Wash[2]
Rainbow Gardens[1]	Gypsum Cave[1]	Stone Mortar Site[2]
McCullough Mountains[1]	Hidden Valley[1]	Oouates[3]
Red Rock Canyon[1]	Lake Las Vegas Intaglio[1]	Unnamed Mesa in Blue Diamond Area[3]

[1] Located outside disposal boundary area
[2] Location uncertain but may be inside disposal boundary area
[3] Location uncertain
Source: Bengston 2004

TABLE 3.6-3
NATIVE AMERICAN TRIBES CONTACTED

Chemehuevi Indian Tribe	Pahrump Paiute Tribe
Colorado River Indian Tribes	Moapa Paiute Tribe
Fort Mojave Indian Tribe	Paiute Indian Tribes of Utah
Hopi Tribe	Indian Peaks Band of Paiute Indian Tribes of Utah
Hualapai Tribe	Kanosh Band of Paiute Indian Tribes of Utah
Kaibab Paiute Tribe	Koosharem Band of Paiute Indian Tribes of Utah
Las Vegas Paiute Tribe	Shivwits Band of Paiute Indian Tribes of Utah
Twenty-nine Palms Band of Mission Indians	

3.7 PALEONTOLOGICAL RESOURCES

Paleontological resources are the fossilized evidence of past life found in the geologic record. This evidence contains the remains or traces of plants and animals that existed during the 600 million year geological history of southern Nevada. Fossils are unique, non-renewable resources that provide clues to the history of life on earth and thus have scientific value.

The information in this section is based on the Paleontologic Resources Assessment and Treatment Plan for the Las Vegas Valley Disposal Boundary Environmental Impact Statement, Clark County, Nevada, May 2004.

3.7.1 Paleontological Sensitive Formations

Fossil-bearing units include sedimentary rocks and unconsolidated sediments that were deposited in a variety of depositional environments. The units present in the disposal boundary area with significant fossil occurrences were deposited in environments ranging from alluvial fans to stream channels, floodplains, and lakes. Successively younger sediments have been deposited in the area and the older units have been lithified to

competent rock. The depositional processes also resulted in the accumulation and preservation of fossil materials. Organisms that produced the fossils may have lived within the depositional environment or may have been transported and deposited along with sediments. Sediment transport and depositional processes often result in enhanced deposition and preservation of certain types of fossils within a restricted vertical section of the stratigraphic sequence. These zones can be mapped based on field observations. For example, fine grained deposits such as floodplain and lake deposits of clay and silt often contain preserved leaf imprints and other plant fossils, while stream channel deposits may contain large vertebrate skeletal debris that were deposited by the stream.

High sensitivity areas in the disposal boundary area include outcrops of sedimentary rock units that contain a relatively high density of documented vertebrate fossil sites. The geologic formations and alluvial deposits that were determined to have high paleontologic sensitivity are described in the following sections and shown in Figure 3.7-1.

3.7.1.1 Horse Spring Formation

The Horse Spring Formation dates from older than 17.2 million years before present (ybp) to possibly 11.9 million ybp. Plant fossils and ichnofossils have been recovered from the Horse Spring Formation in the vicinity of the disposal boundary area. Ichnites (fossilized animal trackways) known to occur from the Horse Spring Formation represent *in situ* evidence of the dynamic activity of extinct animals during life, including speed and direction of movement. Trackways of camel, bird, and coyote-sized dog have been reported from this formation. (SBCM 2004).

3.7.1.2 Muddy Creek Formation

The Muddy Creek Formation is stratigraphically higher than the Horse Spring Formation. The two formations are separated by an unnamed red sandstone unit that is unconformably deposited above the Horse Springs Formation. The geologic age for the Muddy Creek Formation ranges from approximately 10.6 million ybp to 5.9 million ybp. Vertebrate fossils of extinct Miocene and Pliocene taxa including camels, rhinoceroses, and horses, as well as smaller animals such as amphibians and reptiles have been previously reported. Fossilized animal trackways are also known to occur from the Muddy Creek Formation. Fossils recovered from this formation often consist of isolated, disarticulated distal limb elements or other fragmentary, poorly-diagnostic remains. Many of the extinct taxa reported from the Muddy Creek Formation cannot be reliably identified to species or genus. While the formation is fossiliferous and assigned high paleontologic sensitivity, diagnostic fossils are infrequent at best and only occasionally are localized concentrations found. (SBCM 2004).

3.7.1.3 Las Vegas Formation

The Las Vegas Formation (also termed Tule Springs Alloformation) has yielded an assemblage of invertebrate and vertebrate fossil remains that comprise the most significant late Pleistocene assemblage known from the Mojave Desert and one of the most significant assemblages from that time period in the entire Great Basin. A series of light-colored clay and silt deposits are exposed in several large areas along the length of the Las Vegas Valley from Las Vegas northwest to a point several miles west of Indian Springs. Much of the formation occurs in thin horizontal layers that contain abundant gastropod and mollusk shells. (SBCM 2004).

The Las Vegas Formation has been subdivided into seven primary lithologic units designated A through G, of which Unit G was stratigraphically highest and temporally youngest. Units A and B are the oldest and least exposed in the formation, and both are older than the upper limits of carbon dating. Fossil remains of extinct Pleistocene vertebrates are known from Units B, D, and E. Unit D has been reported to be the most widespread and best-exposed unit and has been demonstrated to produce an extensive molluscan fauna. The base of Unit D has been dated to approximately 25,500 ybp. Unit E channel deposits are rich in vertebrate megafaunal remains and mollusks and ranges in age from approximately 14,000 ybp to 9,300 ybp. (SBCM 2004)

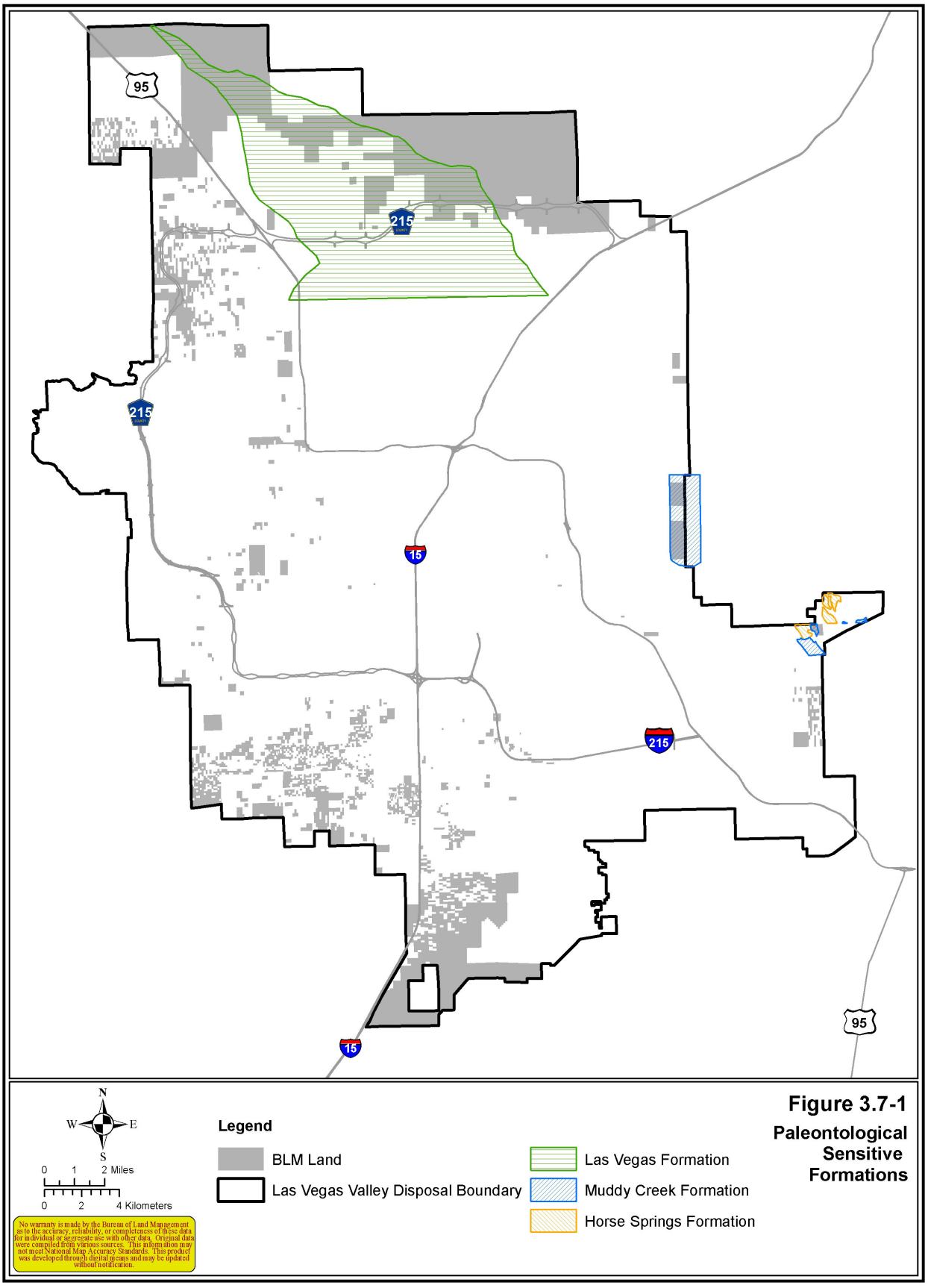


Figure 3.7-1
Paleontological Sensitive Formations

The Las Vegas Formation is highly fossiliferous. Studies have documented the presence of vertebrate fossils of Pleistocene age from exposures of the Las Vegas Formation including amphibians, numerous birds, and large and small mammals. Extinct megafauna have also been exposed including *Nothrotheriops shastensis* (Shasta ground sloth), *Megalonyx jeffersoni* (Jefferson's flat-footed ground sloth), *Panthera atrox* (North American lion), *Camelops hesternus* (large llama like camel), *Equus* spp. (large and small horse), *Bison antiquus* (bison;), and *Mammuthus columbi* (Columbian mammoth). Fossils representing these taxa are derived primarily from Units B, D, and E. (SBCM 2004)

3.7.1.4 Quaternary / Recent Alluvium

The geologic Horse Creek, Muddy Creek, and Las Vegas formations are overlain intermittently by Quaternary (Pleistocene or Recent) alluvium. Depending upon the age at which this alluvium was laid down, this lithologic unit may also have high paleontologic sensitivity. Mammal fossils including a tooth of extinct horse (*Equus* sp.) have been recovered from sediments mapped as Quaternary alluvium identical to that within the disposal boundary area. (SBCM 2004).

3.7.2 Paleontological Survey and Results

The San Bernardino County Museum (SBCM) Division of Geological Sciences researched literature and institutional records to designate areas as having high, low, or undetermined paleontologic sensitivity. Geologic information was assessed to identify formations in the disposal boundary area with a significant potential of fossil occurrences. Most of the disposal boundary area does not contain paleontologic sensitive areas thus only those formations determined to have high sensitivity were surveyed.

A review of the Regional Paleontologic Locality Inventory indicated that numerous paleontologic resource localities have been recorded within the disposal boundary area and the surrounding region. Previous surveys of the region have recorded 44 paleontologic resource localities, including 26 localities that yielded the field recovery of 9,789 fossils of Pleistocene age from the Las Vegas Formation. Records maintained by the BLM and at the Harry Reid Center at the University of Nevada Las Vegas did not reveal any additional paleontologic resource localities that were not already recorded in the Inventory.

Field surveys of the disposal boundary area were conducted from September 2003 through February 2004. Approximately 24,900 acres were surveyed. The high sensitivity areas were surveyed at a Class III level using intensive field survey methods. The primary focus of the survey was to determine the extent of paleontologically sensitive sedimentary exposures and to characterize significant paleontologic resources. The potential occurrence of paleontologic resources in the subsurface was assessed based upon the outcrop exposures, structural relationships, and the stratigraphic position of highly sensitive fossil occurrences identified through the field surveys.

There were 438 previously unrecorded paleontologic resource localities identified during the field survey, all of which were in surface exposures of the Las Vegas Formation. Fossils identified from these localities consisted of nondiagnostic bone fragments which are generally considered to have little potential to be paleontologically significant. However, such fragments may indicate the presence of more substantial remains in the subsurface. The abundance of large, well-preserved bone portions and their close association at some localities suggest the presence of actual bone beds or quarries. The field survey identified bivalves, gastropods, carapace fragments from a large tortoise, fossil remains of rodents and rabbits, and bones and teeth of large mammals including mammoth, horse, bison, and possible large camel species.

3.8 VISUAL RESOURCES

Visual resources include the physical (natural and artificial) and biological features of the landscape that contribute to the scenic quality of an area. Scenic quality is a measure of the visual appeal of the landscape and is perhaps best described as the overall impression retained after passing through an area. Although relative values can be used to

evaluate scenic quality, visual appeal is subjective and can vary among observers.

3.8.1 Visual Resource Inventory

Scenic value is one of the resources for which public lands are managed. The appropriate level of management for visual values and resources is determined through a systematic inventory process. The process identifies affected landscapes and assigns them values. These visual resource values are obtained by considering scenic quality of the landscape, sensitivity of the viewers of that landscape, and distance of that landscape to the viewers.

Scenic quality includes manmade modifications that represent changes to the land, water, or vegetation, or the addition of a structure that creates visual contrast to the natural character of the landscape. The BLM parcels available for disposal are vacant lands except for utility or public use easements. Many of the parcels have been disturbed by activities such as off-highway vehicle use and illegal dumping of trash. The parcels are not remarkable in quality and are generally characterized by flat bajada, which is typical of the surrounding physiographic province. Cultural modifications in the form of urban growth are encroaching on the BLM lands and many are directly adjacent to or surrounded by developed areas, which contribute to the low scenic quality of the parcels.

Sensitivity levels are a measure of public concern for scenic quality. Public roads and residential developments are adjacent to many of the parcels. These parcels are not unique in form, features, or line and are generally considered low to medium in sensitivity levels. Parcels adjacent to special management areas such as the Desert National Wildlife Range to the north, Red Rock Canyon National Conservation Area to the west, and Sloan Canyon National Conservation Area to the south of the disposal boundary area would be considered medium to high in sensitivity levels.

Scenic quality also depends on sight distances. Landscapes are subdivided into three distance zones based on relative visibility from travel routes or observation points. The three zones are foreground-middle ground, background, and seldom seen. The foreground-middle ground zone is visible to the observer and is sensitive to change. It includes areas seen from highways and other viewing locations that are less than three to five miles away. Based on the ease of public accessibility to most parcels in the disposal boundary area, the parcels are considered in the foreground-middle ground zone.

Key Observation Points (KOP) within the disposal boundary area were used to analyze existing visual conditions in accordance with the objectives and methods described in the BLM Visual Resource Management Guidelines (BLM 1986a) and the BLM Visual Resource Contrast Rating Manual (BLM 1986b). The locations of the KOPs are shown on Figure 3.8-1. A description of the visual resource analysis and copies of the inventory forms are included in Appendix C.

3.8.2 Visual Resource Management

Lands are placed into one of four classes based on relative value of the visual resource as determined from the inventory. Class I and Class II are the most valued, Class III represents a moderate value, and Class IV is of least value. Class I is assigned to areas such as wilderness where a management decision is made to maintain a natural landscape, whereas the other classes are based on the combination of scenic quality, sensitivity level, and distance zones.

Table 3.8-1 outlines the visual resource management (VRM) objectives that BLM has established for each of the classes. The VRM classes in the disposal boundary area, as established in the Las Vegas RMP, are shown in Figure 3.8-1. The overall objective of these classes is to limit future impacts on the visual and aesthetic character of the public lands.

The parcels available for disposal located in the south and southwest portion of the Las Vegas Valley are designated as Class IV in the RMP. Management direction for this classification allows activities involving major modification to the existing landscape character. Authorized actions may create significant landscape alterations and would be obvious to casual viewers. The parcels

TABLE 3.8-1
VISUAL RESOURCE INVENTORY CLASS OBJECTIVES

Class	Objective
I	Preserve the existing character of the landscape. Provide for natural ecological changes; however, it does not preclude very limited management activity. Level of change to the characteristic landscape should be very low and must not attract attention. Includes primitive (wilderness) areas, some natural areas, wild sections of national wild and scenic rivers, and other congressionally and administratively designated areas where decisions have been made to preserve a natural landscape.
II	Retain the existing character of the landscape. Level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the causal observer. Any changes must repeat the basic element of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
III	Partially retain the existing character of the landscape. Level of change to the characteristic landscape can be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
IV	Provide management activities that require major modifications of the existing character of the landscape. Level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

available for disposal located in the north end the Valley are designated as Class III in the RMP. Management direction for this VRM class is to manage for partial retention of the existing character of the landscape. In these areas, authorized actions may alter the existing landscape but not to the extent that they attract or focus attention of the casual viewer. There are no Class I lands adjacent to the disposal boundary area. The area to the southeast that includes Sloan Canyon National Conservation Area (NCA) and the land to the west that includes Red Rock Canyon NCA are designated as Class II in the RMP. These areas are managed for their visual features.

3.9 LAND USE

Land use is dependent upon land ownership and the governing entities' management plans that define land use types and regulate development patterns.

3.9.1 Land Ownership

Clark County covers 5.12 million acres of land of which approximately 90 percent is under the administration and control of six federal agencies. The BLM manages the majority (57 percent or 2.9 million acres) of this federal land, with the National Park Service, USFWS, Forest Service, Bureau of Reclamation, and U.S. Air Force managing the other 33 percent. State and local government and private and commercial owners hold the remaining 10 percent, or less than 500,000 acres of land in the county. Lands managed by these federal agencies within and adjacent to the disposal boundary area are shown on Figure 1.3-2.

There are approximately 330,500 acres of land within the disposal boundary area under private or federal, state, or local government ownership. Approximately 46,700 of those acres, or 14 percent, are BLM managed lands.

3.9.2 Land Use Planning

The Las Vegas Valley includes 13 planning areas (see Figure 3.9-1) that set goals and policies for guiding future land use and development throughout the Valley. In the incorporated areas land use planning decisions are made and approved by the

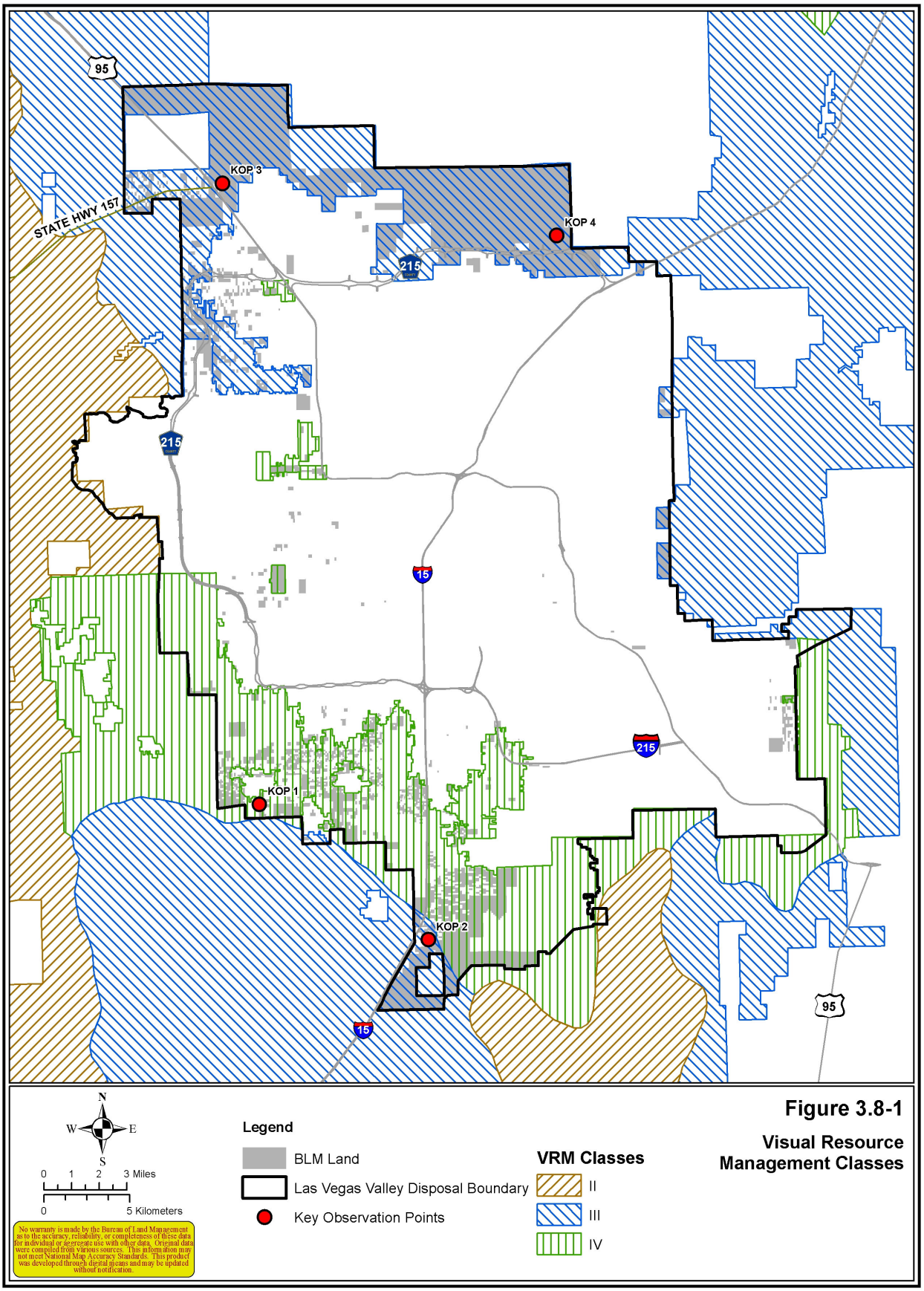


Figure 3.8-1

Visual Resource Management Classes

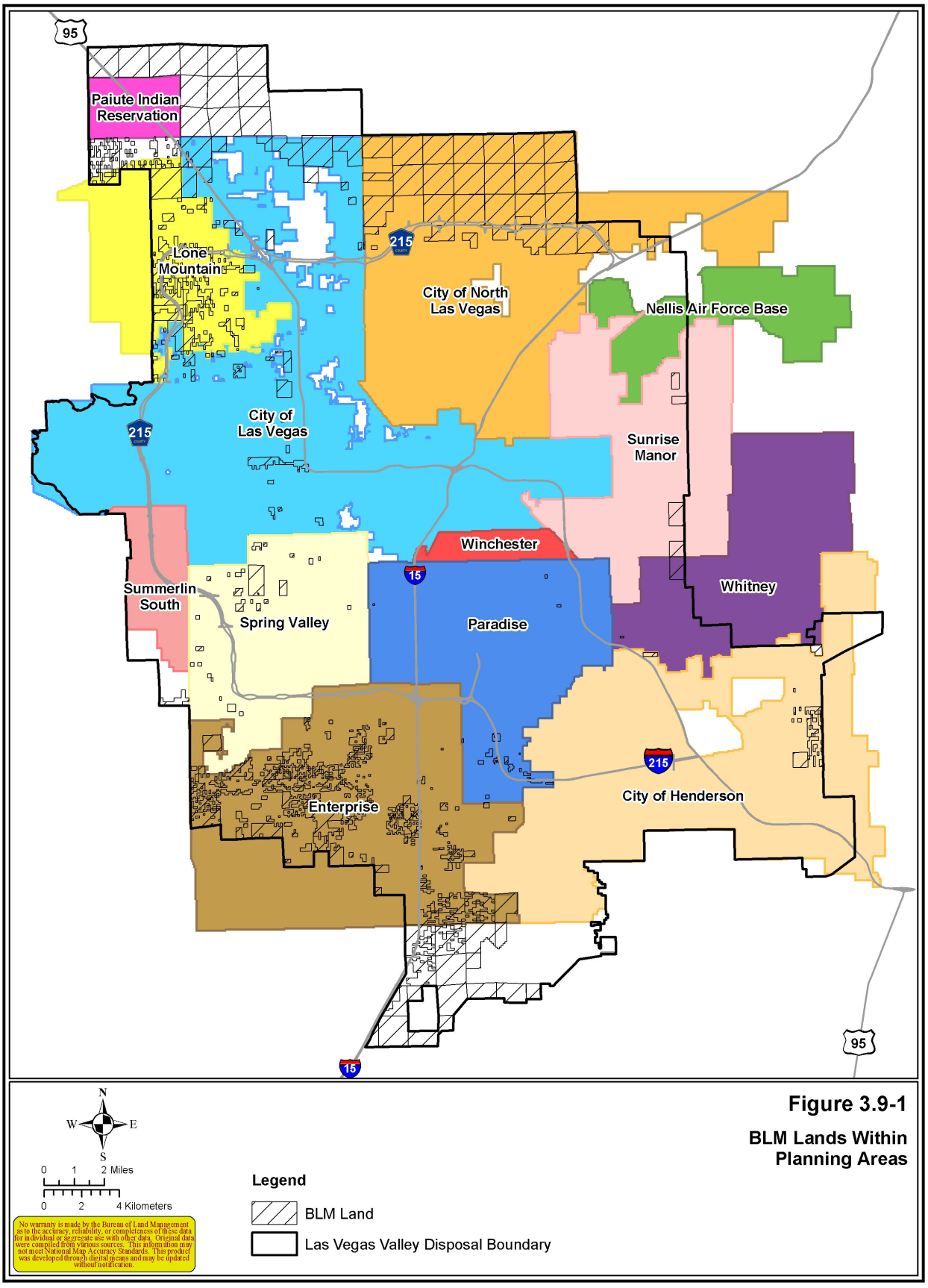


Figure 3.9-1

BLM Lands Within Planning Areas

cities of North Las Vegas, Las Vegas, and Henderson. The town advisory boards of unincorporated areas of Clark County draft plans that are reviewed and approved by the Board of County Commissioners for incorporation to the Clark County Comprehensive Master Plan. The BLM lands within the disposal boundary area located across these community planning areas are shown in Figure 3.9-1. The Clark County Regional Flood Control District guides planning in flood hazard areas throughout the Valley. The 2002 Master Plan Update identifies the type and location of proposed flood control facilities (see Figure 3.3-3).

Land use classifications (or categories) are generally determined by local governments having jurisdiction over the land. These categories are tools that provide a standard language in the planning process to derive a land use plan. Clark County recently revised their categories and reduced them from 64 to 20. The land use categories were first grouped by general topics (i.e., Residential, Commercial, Industrial, and Public Facility) and then grouped a second time by density/intensity. Not all categories are used with each plan; some categories address issues in outlying areas, while others are urban in nature (Clark County 2004).

3.9.3 Current BLM Land Use

The majority of BLM lands within the disposal boundary area are vacant as shown in Figure 3.9-2. Some of these vacant lands are encumbered by public rights-of-way (ROW), leases, permits, or mining claims. Other BLM lands are leased under the Recreation and Public Purposes Act. There are approximately 520 acres of ROW and 6,500 acres of R&PP leases on the remaining BLM managed lands within the disposal boundary area.

3.9.3.1 Rights-of-Way

A ROW allows the use of a specific piece of public land for specific facilities and a specific period of time. The majority of the ROWs are authorized under Title V of FLPMA for structures, pipelines, and facilities to store and transport water, sewer, electrical power, and communications systems, for flood control facilities, and for highways, roads, railroads, and other means of transportation. Other ROWs are also issued for natural gas pipelines under the Mineral Leasing Act of 1928, as amended. The BLM also grants ROWs to the Nevada Department of Transportation for mineral material sites that provide sand and gravel for road maintenance and construction.

The BLM's objective for ROW management is to meet public demand and reduce impacts to sensitive resources by providing an orderly system of development for linear projects and related facilities. Major pipelines and transmission lines are placed within RMP approved corridors and along existing transmission line alignments provided the ROWs are compatible. The ROWs are typically located along north-south and east-west section lines. In some cases, utility and transportation ROWs are granted using a ¼-mile grid for each section. The selection and length of ROW alignments are based on city and county land use and development plans. The ROW alignments would vary in length and may in some cases terminate at the ¼- or ½-section lines. Up to 12,700 acres of ROWs may be granted using the ¼-section line system. A description of the typical construction requirements for temporary and permanent ROWs is provided in Section 2.3.

The Las Vegas Field Office issued an average of 127 new ROW applications per year since 2001, which disturbed approximately 1,300 acres annually. Approximately 50 percent of the applications have a temporary use permit that allows the applicant to temporarily disturb land adjacent to the ROW to facilitate the construction or installation of the facility.

3.9.3.2 Recreation and Public Purpose Leases

Recognizing the strong public need for a nationwide system of parks and other recreational and public purpose areas, the U.S. Congress in 1954 enacted the Recreation and Public Purposes Act as a complete revision of the Recreation Act of 1926. The Act authorizes the lease or conveyance of public lands at no cost for recreational uses by governmental entities or reduced cost for public purposes to state and local governments and to

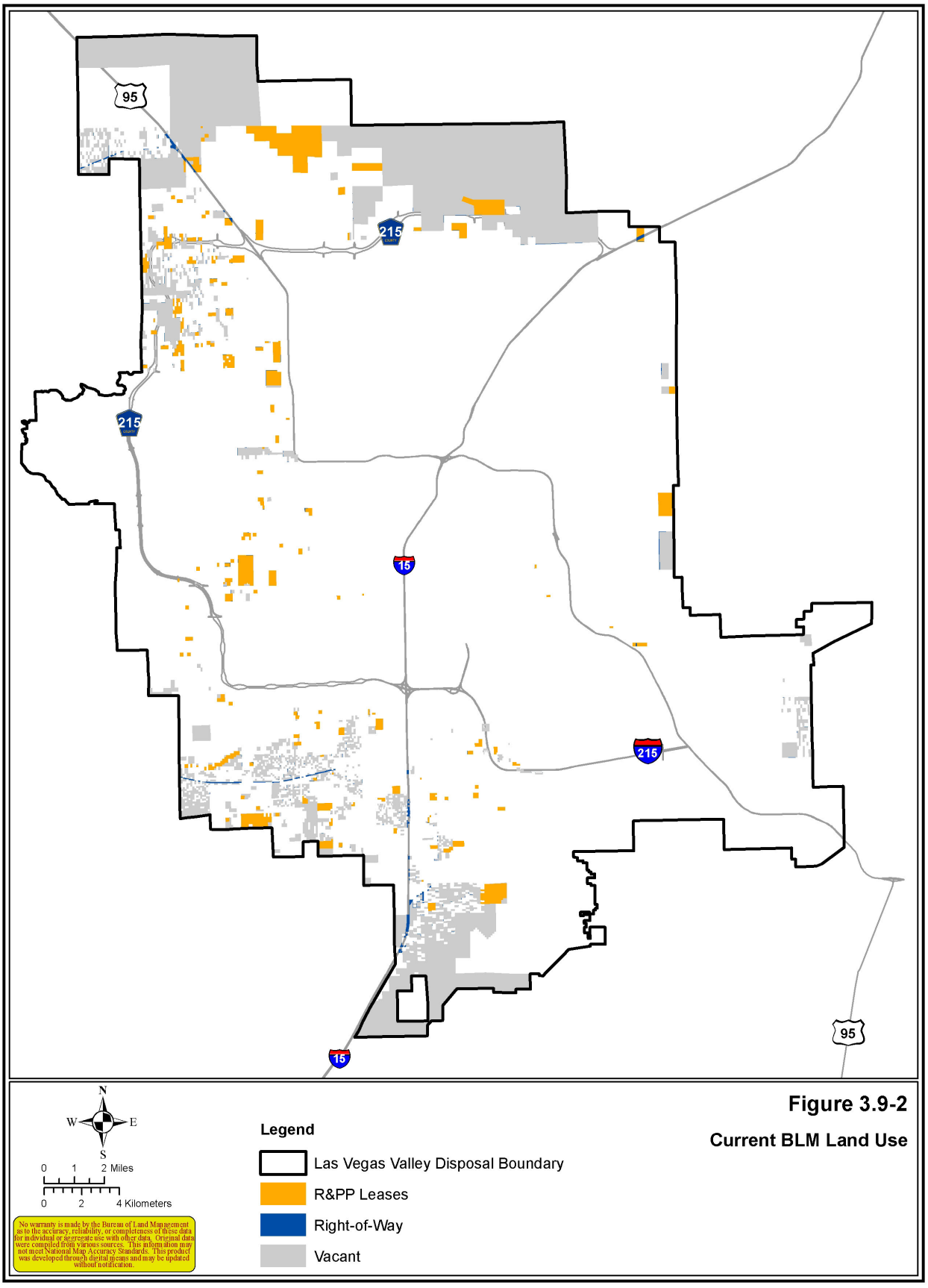


Figure 3.9-2

Current BLM Land Use

qualified non-profit organizations. Leases and patents granted under the R&PP Act require that the land continue to be used for the stated purpose. Counties, cities, or other political subdivisions of a state and non-profit organizations may purchase up to 6,400 acres a year for recreation purposes and an additional 640 acres for other public purposes. These lands must be within the political boundaries of the public entities or within the area of jurisdiction of the organization.

The Las Vegas Field Office issued an average of 10 new R&PP leases for approximately 440 acres per year since 2001. Common R&PP leases include parks, community centers, schools, libraries, fire stations, public golf courses, law enforcement facilities, flood control detention basins, and sewage treatment facilities. The leases average 15 acres to 40 acres in size with larger, regional parks covering 100 acres or more.

3.9.4 Planned BLM Land Use

The developed uses of BLM lands that were disposed of under SNPLMA from October 1998 through December 2000 were used to determine the type of land use development expected for future BLM land disposals. A majority of the BLM managed lands within the disposal boundary area fall within a community land use plan as shown in Figure 3.9-1. There are 27 planned development land use categories within these planning areas that are used by the Regional Transportation Commission of Southern Nevada (RTC) for transportation planning (RTC 2002). These land use categories were regrouped into nine land development or end-use groups for purposes of the air quality study (see Section 3.1). The categories and the projected end use development of future land that is disposed are:

- Single-family housing – 46 percent
- Multi-family housing – 5 percent
- Office buildings – 12 percent
- Retail space – 10 percent
- Hotel/casinos – 1 percent
- Light industry – 13 percent
- Religious facilities – 1 percent
- Public facilities – 5 percent
- Recreation/open space 7 percent

Figure 3.9-3 shows the planned land use on BLM land within the disposal boundary area using the nine end use development categories. As shown in the figure, some of the BLM land within the disposal boundary area had no planned land use data associated with it. The larger area in the northwest corner of the disposal boundary area is the land released from wilderness designation by the Clark County Act of 2002, whereas the area in the south is outside the planning jurisdiction of the City of Henderson. Some of the smaller parcels in the interior of the disposal boundary area are under R&PP leases.

As stated, the Clark County Act released BLM lands from wilderness study designation, which include approximately 11,250 acres of land within the disposal boundary area. The wilderness study areas (WSAs) released included Nellis A, B, and C and Quail Springs (see Figure 3.10-3). The Nellis WSAs are included in the 1999 North Las Vegas Land Use Plan as Wilderness Study Area and are included in the recreation/open space end use development category. The Quail Springs WSA is included in the City of Las Vegas General Land Use Plan (1997) as Resource Conservation. These land use plans have not been updated since the Clark County Act was enacted thus there is no planned land use data available for those areas. However, the land use plans are expected to be updated and the released WSAs would most likely be planned for other uses including residential and commercial in addition to recreation and open space.

3.10 RECREATION AND WILDERNESS

There are a number of recreation opportunities provided by local, state, and federal agencies on public lands within and adjacent to the disposal boundary area. Recreation activities generally include casual or dispersed uses, and organized events. Typical dispersed recreation includes camping, picnicking, mountain biking, hiking, rock climbing, sight-seeing, photography, and off-highway vehicle (OHV) use. Organized recreation includes competitive and commercial events or activities that generally require a special rec-

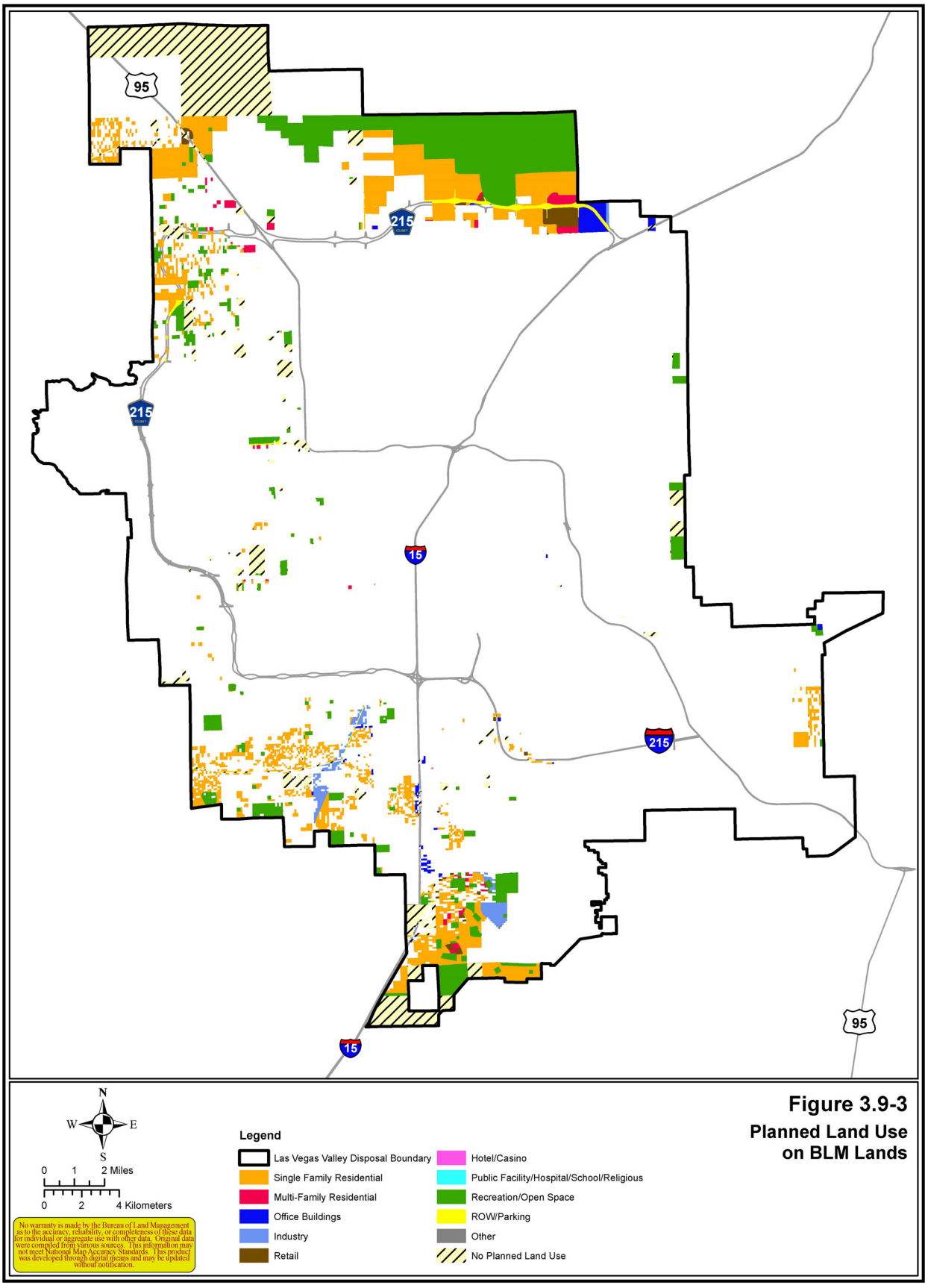


Figure 3.9-3
Planned Land Use on BLM Lands

reation use permit from the BLM, such as OHV guided tours, and all-terrain bicycle events.

The BLM defines recreation value through a Recreation Opportunity Spectrum (ROS) process. This process identifies the recreation opportunities based on the area's setting and activities, and then assigns the area to one of five categories which defines its management objectives. The BLM lands in the Las Vegas Valley are categorized modern urban with rural, roaded natural, semi-primitive motorized, and semi-primitive non-motorized lands located adjacent to and outside the Valley.

3.10.1 Recreation Areas

There are a number of local recreation and conservation areas under federal and state management adjacent to and in the vicinity of the disposal boundary area. In addition to the BLM, the other managing agencies include USFWS, U.S. Forest Service (USFS), National Park Service (NPS), and Nevada Division of State Parks (NDSP). Information on these local areas is listed in Table 3.10-1 and Figure 3.10-1 shows the areas adjacent to the disposal boundary area.

The BLM records and tracks the visitor data through the Recreational Management Information System (RMIS). Visitor use is based on actual numbers where available, such as traffic counts at Red Rock National Conservation Area or at OHV events at Nellis Dunes. Otherwise visitor use is compiled based on the BLM's knowledge and professional estimates for specific activities and locations.

Red Rock Canyon National Conservation Area (NCA) is located along the west side of the disposal boundary area. Recreation activities include sight-seeing, climbing, hiking, biking, and interpretive programs sponsored by the BLM. Desert bighorn sheep hunting on a tag basis is allowed above 5,000 feet. Red Rock NCA has the only developed campground managed by the BLM in the Las Vegas Valley. The Spring Mountain Ranch State Park is located within Red Rock Canyon NCA. Recreation opportunities include picnicking, historic tours, living history programs, and summer theatre programs.

The Sloan Canyon NCA is located directly south of the disposal boundary area. This area contains unique scenery, geologic features, and cultural resource values. Recreation activities include hiking and viewing archeological, biological, and geological resources. Designated as an NCA in 2002, the management of the area is in the planning process.

The Frenchman/Sunrise Mountain Natural Area is located east of the disposal boundary area. This area was designated for its unique geologic values. Recreation activities include backpacking, picnicking, hiking, biking, and rock hounding.

The Nellis Dunes Recreation Area is located to the northeast of the disposal boundary area. Nellis Dunes is a popular recreation site for casual use OHV free play by all-terrain vehicle enthusiasts. The Desert National Wildlife Range is located directly north of the disposal boundary area. The largest in the lower 48 states, the Sheep Mountain Range supports habitat for desert bighorn sheep. Recreation opportunities include camping, hiking, backpacking, bird watching, horseback riding, and OHV driving on existing roads and trails for pleasure. Limited hunting for desert bighorn sheep is permitted once a year between November and January.

The Spring Mountain National Recreation Area is located northwest of Las Vegas and is part of the Humbolt-Toiyabe National Forest. The area is locally referred to as Mt. Charleston. Recreation opportunities include hiking, camping, climbing, snow skiing, snow boarding, sightseeing, OHV driving for pleasure, picnicking, and bird watching.

Floyd Lamb State Park, originally known as Tule Springs, is located in the northwest area of the disposal boundary area. The park provides for picnicking, hiking, biking, horseback riding, and fishing.

Lake Mead National Recreation Area is a popular water recreation and visitor destination located east of the disposal boundary area near Boulder City. The recreation area has 200,000 surface

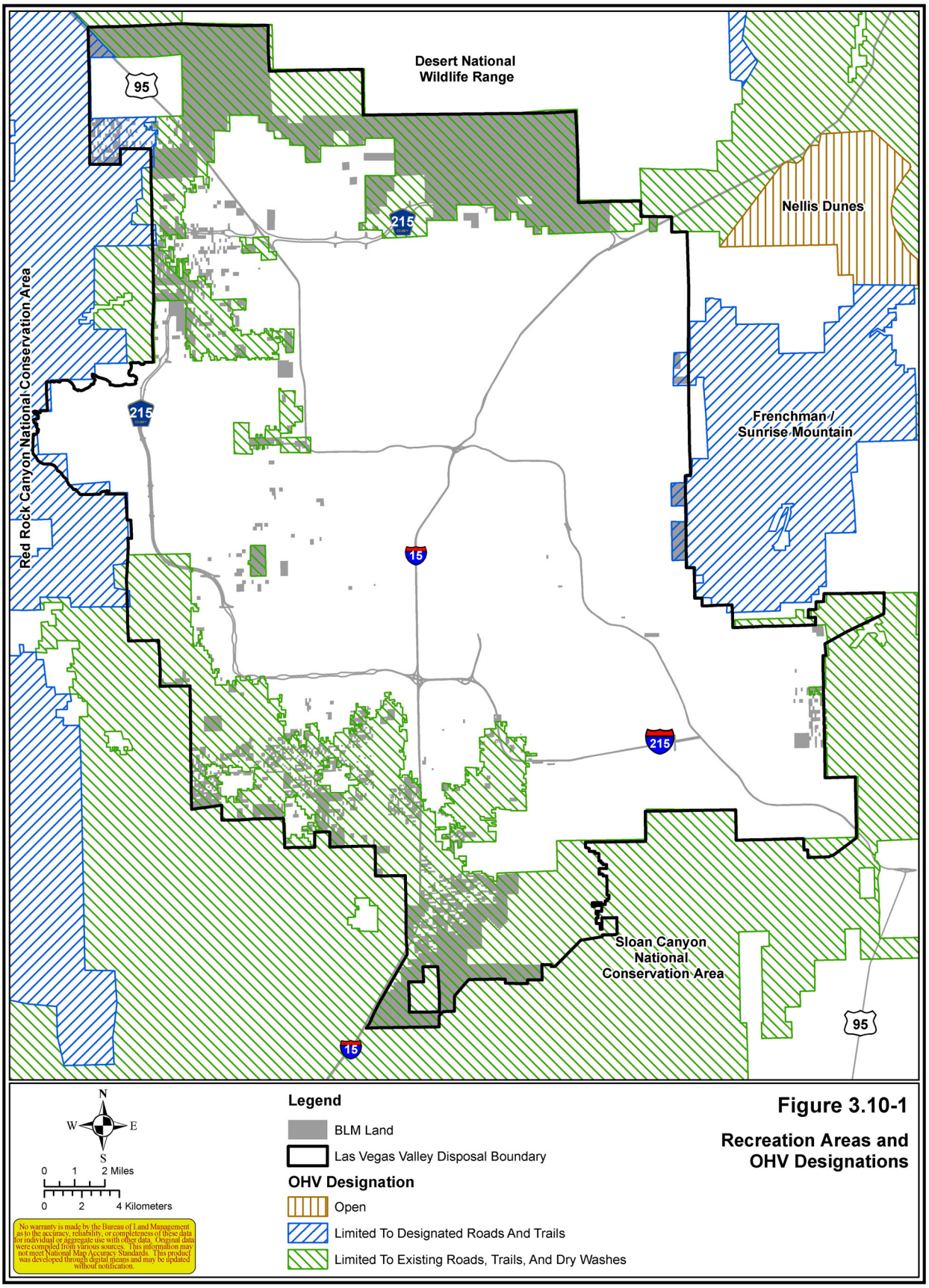

Desert National
Wildlife Range
Nellis Dunes
Frenchman /
Sunrise Mountain
Red Rock Canyon National Conservation Area
Sloan Canyon
National
Conservation Area
95
215
15
N
W
E
S
0 1 2 Miles
0 2 4 Kilometers
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
Legend
BLM Land
Las Vegas Valley Disposal Boundary
OHV Designation
Open
Limited To Designated Roads And Trails
Limited To Existing Roads, Trails, And Dry Washes
Figure 3.10-1
Recreation Areas and
OHV Designations

TABLE 3.10-1
LOCAL RECREATION AREAS

Recreation Area	Managing Agency	Acres	Visitors (2003)
Red Rock Canyon National Conservation Area	BLM	196,610	1,500,000
Sloan Canyon National Conservation Area	BLM	48,438	4,200
Frenchman/Sunrise Mountain Natural Area	BLM	10,240	20,000
Nellis Dunes Recreation Area	BLM	10,000	285,000
Desert National Wildlife Range	USFWS	1,600,000	68,000[1]
Spring Mountain National Recreation Area	USFS	316,000	2,000,000
Floyd Lamb State Park	NDSP	2,054[2]	208,486
Spring Mountain Ranch State Park	NDSP	520	208,651
Lake Mead National Recreation Area	NPS	1,495,664	7,829,475

[1] 2002 data.
[2] 1,040 acres are R&PP lease and 1,014 acres are owned by the NDSP.

acres of water and 950 miles of shoreline on Lake Mead and Lake Mohave. Recreation opportunities include boating, fishing water skiing, personal watercraft use, diving, para-sailing, picnicking, camping, and isolated backcountry use.

3.10.2 Off-Highway Vehicle Use

Management of OHV activities on public lands is to conserve soil, wildlife, water quality, native vegetation, air quality, and cultural resources while providing for appropriate recreational opportunities and promoting the safety of all users. The use of OHVs on BLM lands has increased in popularity in recent years and accounts for over four million visitor hours throughout the Las Vegas Field Office (BLM 1998). The term "OHV" collectively refers to a motorized vehicle that is capable of off-highway travel, and includes street-legal, licensed vehicles (Dual Sport motorcycles, 4x4 vehicles, sport utility vehicles) and all-terrain vehicles (ATVs) and dirt motorcycles that are not street-legal or licensed (Bruno 2004).

Off-highway access is designated to protect resources and the landscape from damage, to ensure public safety, and to minimize conflict among users. The three main designations are "open," "limited," or "closed" to OHV use and are described in Table 3-10-2. Designations are made through the land use planning process and are updated and revised as necessary to meet resource management objectives and to mitigate OHV-related impacts.

Operators of OHVs must comply with Nevada laws and federal regulations when operating on public lands. The OHV use designations on BLM lands are shown in Figure 3.10-1. Use is limited to existing or designated roads and trails on lands within and adjacent to the disposal boundary area, with the Nellis Dunes Recreation Area providing over 10,000 acres of open area for OHV users. Wilderness areas are closed to OHV use.

3.10.3 Public Trails System

The Southern Nevada Regional Planning Coalition (SNRPC), represented by Clark County, Clark County School District, and the cities of Las Vegas, North Las Vegas, Henderson and Boulder City, developed a plan for a system of interconnected trails throughout the Las Vegas Valley. The plan addresses primary urban trail corridors that follow highways, utility rights-of-way, flood control facilities, and natural features such as desert washes and ridgelines, and secondary trails integrated into existing and planned public infrastructure and rights-of-way. The locations of trails were selected based on the ability to create a connection to federal lands. The proposed system of trails is shown in Figure 3.10-2.

TABLE 3.10-2
OHV DESIGNATIONS

Designation	Use
Open	• Area of intensive OHV use with no resource, user, or public safety conflicts • Vehicle travel permitted both on and off roads • Vehicle must be operated responsibly and must not cause significant damage to resources or to other authorized uses of public land
Limited	• Restricted OHV use to meet specific resource management objectives • Vehicle travel permitted only on existing roads and trails in existence prior to the designation • Vehicle travel permitted only on designated roads and trails that are identified, signed, and mapped by BLM • Vehicle travel limited by the number and type of vehicle • Vehicle travel limited by time or season • Vehicle travel limited to licensed or permitted use
Closed	• Prohibited OHV use to protect resources, ensure visitor safety, or reduce conflicts • Vehicle travel not allowed both on or off roads and trails • Access by non-motorized vehicle is generally allowed

The SNPLMA allocated funds for development of parks, trails, and natural areas in Clark County. From 1999 to 2003, approximately $75 million has been allocated to the trail system in Clark County. Another $57 million has been allocated to the Clark County Wetlands Park, which includes an extensive public trails system.

3.10.4 Wilderness Areas

The Clark County Act designated areas as wilderness for inclusion in the National Wilderness Preservation System and released wilderness study areas (WSA) to be managed in accordance with land management plans. There were four WSAs that were released from interim management as wilderness within the disposal boundary area. Shown in Figure 3.10-3, these WSAs include Nellis A, Nellis B, Nellis C, and Quail Springs.

The BLM manages all or portions of three wilderness areas and one instant study area (ISA) adjacent to the disposal boundary area as shown in Figure 3.10-3. The North McCullough Wilderness Area covers 14,763 acres and is located within the Sloan Canyon NCA. The La Madre Mountain and Rainbow Mountain Wilderness Areas cover lands managed by the BLM and USFS. The BLM managed lands in these wilderness areas (28,879 acres in La Madre Mountain and 20,311 acres in Rainbow Mountain) are located within the Red Rock Canyon NCA. The Sunrise Mountain ISA is located to the east of the disposal boundary area.

Recreation activities are restricted in these areas. Motorized and mechanized vehicles and equipment, including mountain bikes, cannot be used in designated wilderness areas but may be used on existing routes within the ISA. Persons requiring the use of wheelchairs may use them in wilderness areas. Special recreation permits for outfitting and guiding may be approved but competitive permitted events are not authorized.

3.11 HAZARDOUS MATERIALS

Hazardous materials are substances that may present a danger to public health and safety or to the environment because of quantity, concentration, or physical, chemical, or infectious characteristics. This definition includes those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA).

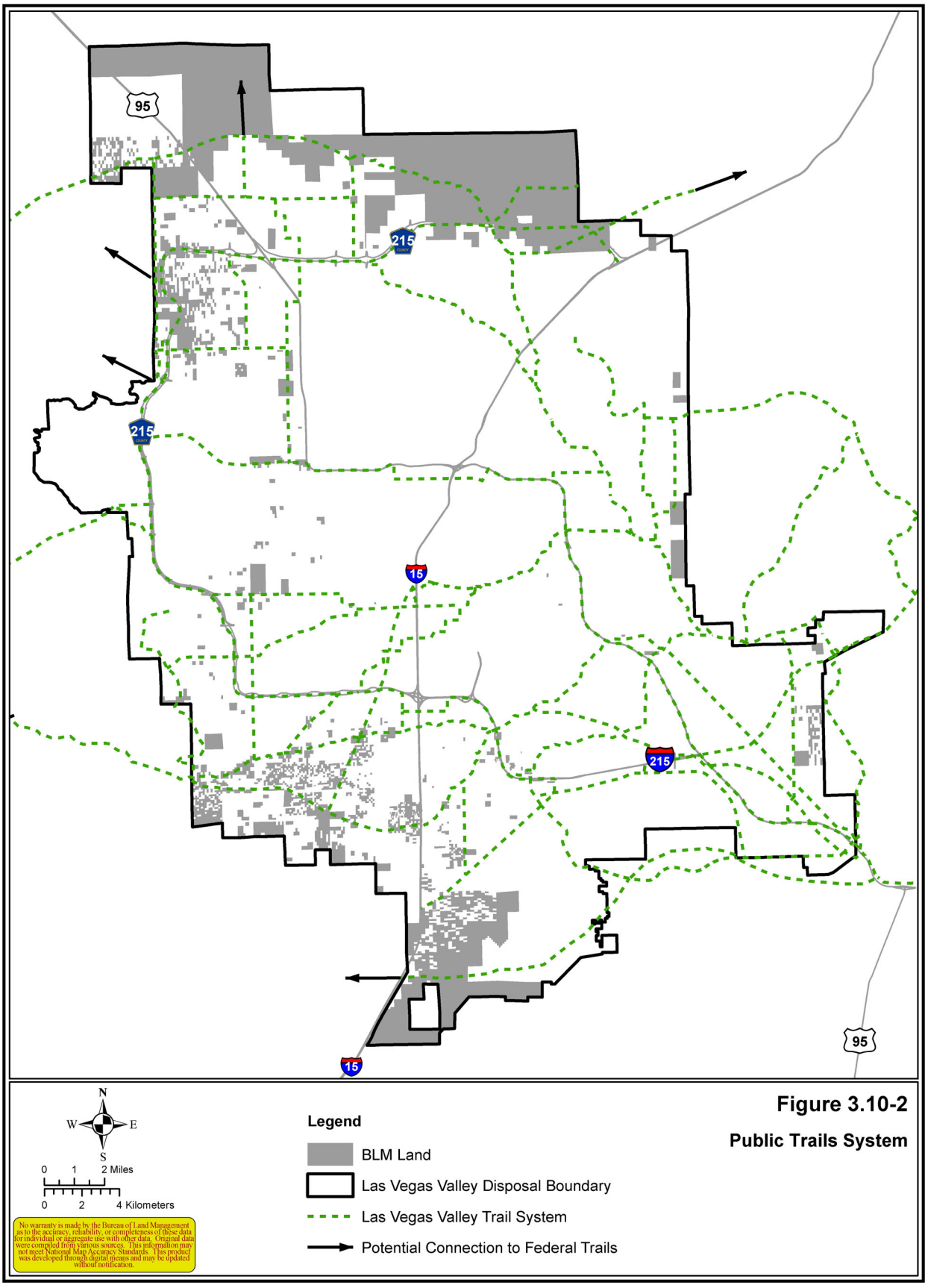


Figure 3.10-2

Public Trails System

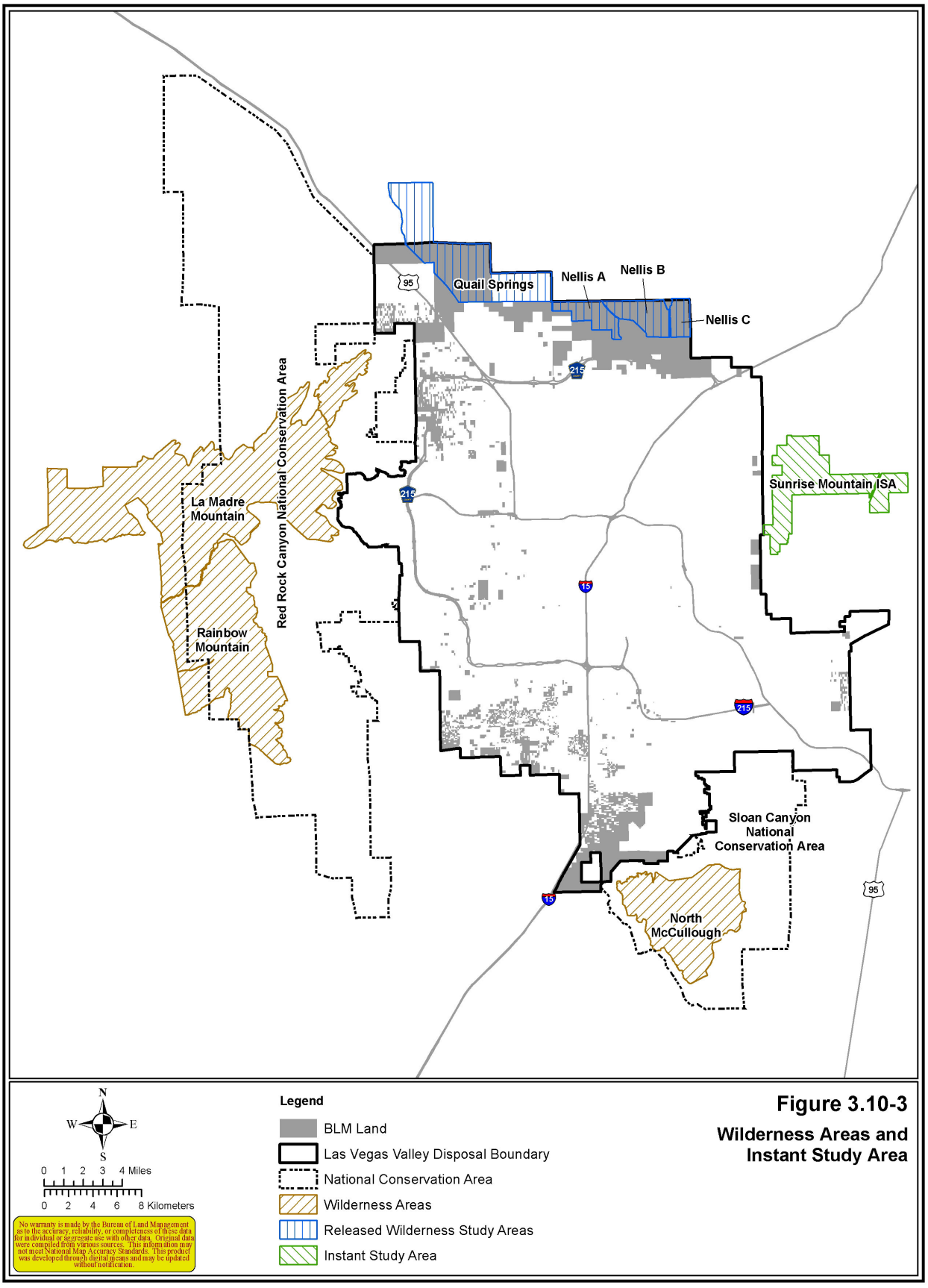


Figure 3.10-3
Wilderness Areas and Instant Study Area

A modified Phase I Environmental Site Assessment (Phase I) was completed using the guidelines in the American Society for Testing and Materials (ASTM) Standard E 1527-00 and Section 120(h) of CERCLA. It was modified because of the size of the disposal boundary area and the uniqueness of the proposed action. A Phase I consists of four components; records review, interviews, site reconnaissance, and reports. The records review generally includes historical aerial photographs and land title records. However, it was assumed that the BLM has been the only landowner; thus, determining land ownership status and conducting interviews of current and past occupants were not necessary. The site reconnaissance was limited because of the amount of acreage involved and the dispersed geographic area. A site-specific Phase I would be prepared in accordance with Section 120(h) of CERCLA within 30 days of transferring title of BLM land to the prospective purchaser.

3.11.1 Environmental Databases

State and federal regulatory agencies environmental databases were reviewed to identify reported releases of hazardous substances to soils or groundwater on or within the vicinity of public lands within the disposal boundary area. The BLM lands available for disposal were clustered to conduct the database searches. The search criteria created a corridor around each cluster of BLM parcels and a standard search radius of up to one mile around each cluster was used to identify reported releases or locations of environmental concerns. The databases searched provided 100 percent coverage for the clusters of parcels. The number of sites identified from the environmental database search is presented in Table 3.11-1. A detailed description of each environmental database is presented in Appendix D.

There were 285 sites identified from the environmental database search. A total of 8 sites are located on BLM parcels. An additional site, Sunrise Mountain Landfill, is outside the disposal boundary area and upgradient of BLM parcels within the disposal boundary area. Another site, the 7-Eleven is on private land upgradient of a BLM parcel within the disposal boundary area. All sites are described in Table 3.11-2 and are shown on Figure 3.11-1

3.11.2 Site Reconnaissance

A site reconnaissance of the BLM parcels was conducted between October 2003 and January 2004. The parcels were selected on a random basis and covered 75 percent of the total parcels within the disposal boundary area. The reconnaissance consisted of a field survey of the vacant parcels to identify evidence of present and potential environmental concerns. Surveyors used existing roads, while walking 75 percent of the interior and exterior portions of selected parcels. Observations of conditions were noted by the surveyors from the vehicle and on foot. The amount of land included in this analysis was a major limitation, therefore 100 percent coverage was not guaranteed. Some of the parcels randomly selected for reconnaissance were R&PP leases that were developed with facilities, including schools, parks, fire stations, and detention basins.

General observations made during the site reconnaissance included numerous dump sites, fill piles, tires, household waste, paint cans, concrete, and landscape debris. The fill piles generally contained soil or asphalt and a mix of construction related waste. Small areas of soil staining associated with the fill piles and dump sites were observed on some of the parcels. Other less abundant solid waste observed included building materials, used furniture, cars, and empty five-gallon buckets and 55-gallon drums. The buckets and drums did not have visible labels but they appeared to have contained paint or petroleum products.

There was no visible evidence of prior agriculture or landscaping activity that may indicate historic use of pesticides or herbicides. There were no pole-mounted or pad-mounted transformers observed that could indicate the presence of polychlorinated biphenyls.

TABLE 3.11-1
ENVIRONMENTAL DATABASE RESULTS

Federal Regulatory Databases	Sites Identified
National Priority List and Proposed National Priority List	0
Comprehensive Environmental Response, Compensation, and Liability Information System	0
Comprehensive Environmental Response, Compensation, and Liability Information System No Further Remedial Action Planned	0
Corrective Action Report	0
Resource Conservation and Recovery Information System Treatment, Storage, Disposal	0
Resource Conservation and Recovery Act (RCRA) Generators	59
Emergency Response Notification System (ERNS)	1
State Regulatory Databases	
Hazardous Waste Generator	107
State Landfills	3
Leaking Underground Storage Tanks (LUST)	21
Underground Storage Tanks (UST)	89
Aboveground Storage Tanks (AST)	5

TABLE 3.11-2
SITES IDENTIFIED ON/ADJACENT TO BLM PARCELS

Site	Database	APN[1]	Description
City of LV Vehicle Services 2950 Ronemus Drive Las Vegas, NV	RCRA Generator	[2]138-15-201-002	Small quantity generator; does not present an environmental concern
Construction Vehicle Spill Rufin at El Campo Grande Las Vegas, NV	State Hazardous Waste Generator	[2]126-36-201-001	Release of motor oil into the soil; no closure date indicated; may present an environmental concern
Lone Mountain Gravel Pit Lone Mountain Road Las Vegas, NV	RCRA Generator	[2]137-01-501-001	Confirmed release of motor oil into the soil; closure date identified; does not present an environmental concern
7-Eleven #25123 6980 Westcliff Drive Las Vegas, NV	LUST	[3]138-27-801-002	Confirmed release of gasoline into soil; no closure date; may present an environmental concern; upgradient of BLM parcel 138-27-301-011
Fire Station #41 6989 N. Buffalo Drive Las Vegas, NV	UST	[2]125-21-601-008	One registered 4,000 gallon diesel tank in use; may present an environmental concern if tank leaked
Lone Mountain Plant Nevada Ready Mix Corporation Lone Mountain Road Las Vegas, NV	UST; AST	[2]126-36-401-001	24 registered USTs; 22 registered ASTs; may present an environmental concern if tanks leaked
Sunrise Mountain Landfill 7900 Vegas Valley Drive Las Vegas, NV	UST	[3]161-12-000-001	4 registered USTs; does not present an environmental concern; upgradient of BLM parcel 161-11-801-001 within disposal boundary area; Sunrise landfill is on BLM land outside the disposal boundary area and currently under EPA RCRA and

TABLE 3.11-2
SITES IDENTIFIED ON/ADJACENT TO BLM PARCELS

Site	Database	APN[1]	Description
			Clean Water Act corrective action orders
Vegas Valley Plant 6610 E. Vegas Valley Dr Las Vegas, NV	AST	[2]161-11-801-001	2 registered ASTs; does not present an environmental concern
Abbies Recycling Center 6390 E. Vegas Valley Dr Las Vegas, NV	AST	[2]161-11-801-001	1 AST; may present an environmental concern if tank leaked
BLM land near Boulder Highway/Russell Road Clark County, NV	ERNS, SHWS	[2]161-34-103-002	Diesel fuel leak; 3 cubic yards of soil remediated; does not present an environmental concern

[1] Assessor Parcel Number
[2] BLM Parcel
[3] Site upgradient of BLM Parcel

TABLE 3.11-3
RECOGNIZED ENVIRONMENTAL CONDITIONS ON BLM LAND

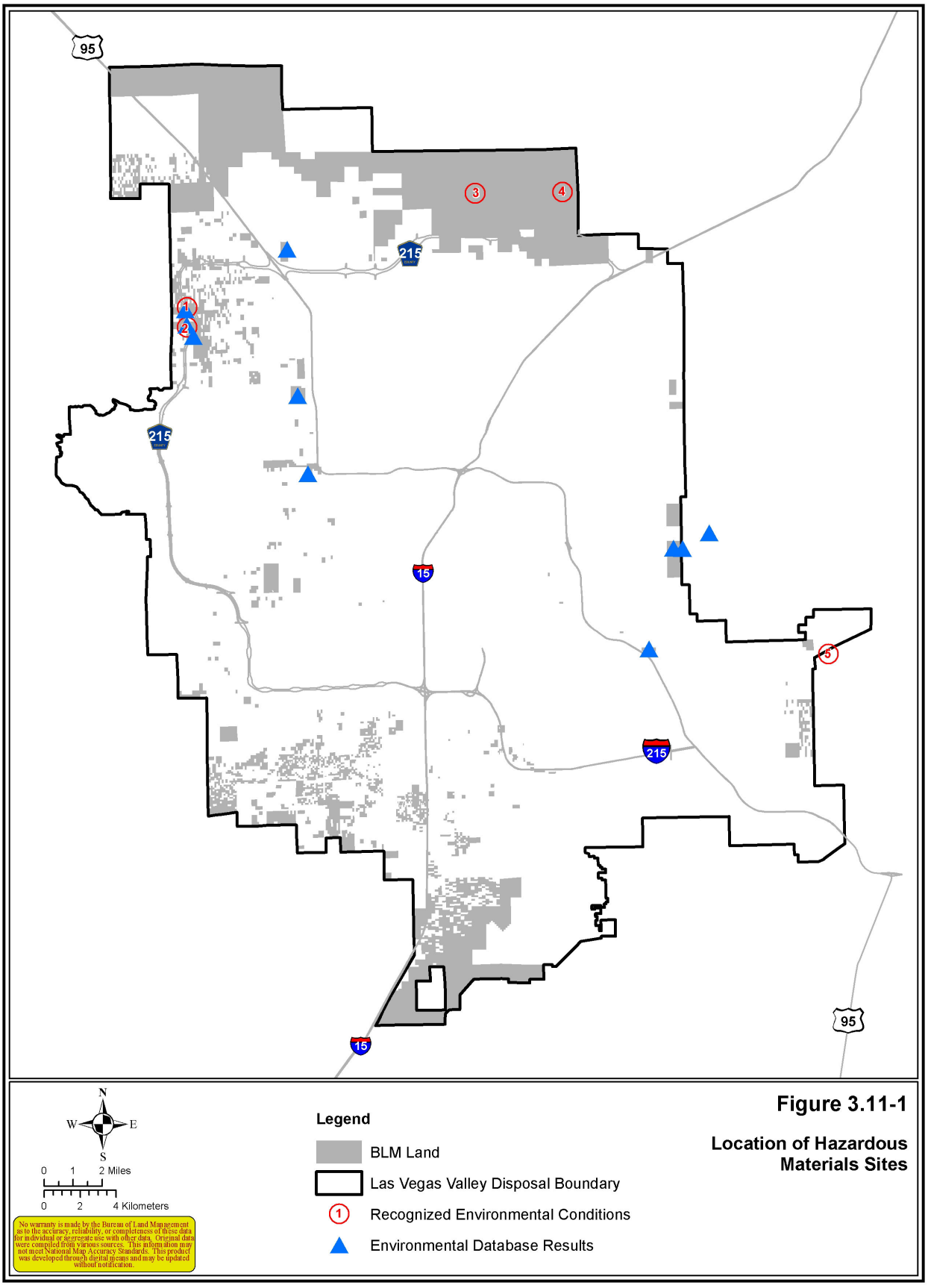
REC	APN	Description
1	126-36-201-001	Spill from a construction vehicle in the vicinity of Rufin at El Campo Grande involved a release of motor oil into the soil. The environmental database search did not indicate a case closure date or if remediation has occurred; however, there are investigation activities on-going. The release was reported August 16, 2000 and the last modification to the database was September 30, 2003. This site is located on a BLM parcel and is upgradient of other BLM parcels.
2	126-36-401-001	Lone Mountain Plant, an active gravel quarry owned by Nevada Ready Mix Corp, has 24 USTs and 22 ASTs. There have been reported releases at the quarry. This site is located on a BLM parcel and is upgradient of other BLM parcels.
3	124-10-000-001	Steel pipes were observed protruding from the ground. The use of these pipes is unknown; however, they could act as a conduit for contamination into the soil and/or groundwater. This site is located on a BLM parcel and is upgradient of other BLM parcels.
4	123-07-000-001	Debris, structures, and past activities associated with the abandoned firing range used by Nellis Air Force Base may indicate surface and/or subsurface contamination. This site is located on a BLM parcel and is upgradient of other BLM parcels.
5	160-34-101-004	Dumping and stockpiling of extensive amounts of darkly stained soil with strong diesel odor was observed that may indicate contamination. This site is located on BLM land in close proximity to the Three Kids Mine.

3.11.3 Recognized Environmental Conditions

The objective of a Phase I is to identify Recognized Environmental Conditions (RECs), which are defined by ASTM as "the presence or likely presence of any hazardous substance or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property." There were five RECs on BLM land identified from the review of the environmental databases and site reconnaissance. These RECs are described below and their approximate locations are shown on Figure 3.11-1.

3.12 SOCIOECONOMICS

Socioeconomics are described using demographic and employment measures, as these elements are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Legend
BLM Land
Las Vegas Valley Disposal Boundary
Recognized Environmental Conditions
Environmental Database Results
Figure 3.11-1
Location of Hazardous Materials Sites

the key factors that influence housing demand, education needs, and infrastructure requirements. The disposal boundary area lies entirely within Clark County, Nevada. Due to the large size of the county and the limited economic outflow, the region of influence for analysis is Clark County. Economic data since 1990, when available, are used to track economic trends within the county. Appendix E contains detailed tables of socioeconomic characteristics.

3.12.1 Demographic Characteristics

The demographic characteristics of Clark County used to describe economic growth include the trends in population and personal income.

3.12.1.1 Population

Clark County has the unique significance of being one of the fastest growing counties in the U.S. Population has more than doubled between 1990 and 2003; increasing from approximately 770,000 to 1.62 million people (State of Nevada Demographer 2003). Figure 3.12-1 shows the population growth of Clark County during this time period.

Approximately 81 percent of the growth in Clark County is attributed to net migration with the remaining 19 percent from natural changes.

Primary reasons for the population surge is an influx of new residents moving to Clark County to take advantage of increased economic opportunity, relatively low housing costs, relatively low cost of living, outdoor recreation opportunities, and climate. Employment in the construction, hotel/casino, education, government, and services industries provides an incentive for people to relocate to Clark County. In addition, many new residents move to the Las Vegas Valley to retire.

3.12.1.2 Personal Income

According to the U.S. Bureau of Economic Analysis (BEA), total personal income for Clark County almost tripled since 1990. As shown in Table 3.12-1, total income increased from approximately $15.2 million to $44.6 million. During the same time period per capita personal income increased 48 percent from approximately $19,800 in 1990 to $29,400 in 2002. However, the 2002 per capita personal income for Clark County was lower than the national average of $30,900. (BEA 2002a).

3.12.2 Economic Characteristics

The level of employment for a given area can be used to draw conclusions on the health and stability of the local economy. The BEA estimates annual employment and earnings. Total annual employment includes full-time and part-time jobs, thus individuals with more than one job would be counted twice. Employment estimates include individuals employed by businesses, public organizations, and those who are self employed.

3.12.2.1 Employment

The BEA uses the Standard Industrial Classification (SIC) system to identify business establishments by the principal activity in which they are engaged. The SIC system was expanded in 2001 to the North American Industry Classification System (NAICS) to clarify several industries. For comparison purposes for this analysis, similar types of service industries have been combined from the SIC and NAICS. Standard industry types and the related number of employees in Clark County for 1990 and 2002 are shown in Table 3.12-2.

From 1990 to 2002 the Clark County labor force increased by 94 percent from 458,960 workers to 890,519 workers. New job growth within Clark County was relatively steady during this time period, adding an average of 33,000 new jobs per year. This represents an average annual growth rate of 7.2 percent.

Employment by industry for 2002 is shown in Figure 3.12-2. The services industry, which includes hotels and gaming, represents approximately half of the total employment for Clark County. The finance, insurance, and real estate industry, retail trade, and government comprise the next largest percentages of total employment.

Clark County and the State of Nevada had very similar unemployment rates from 1990 to 2003 as

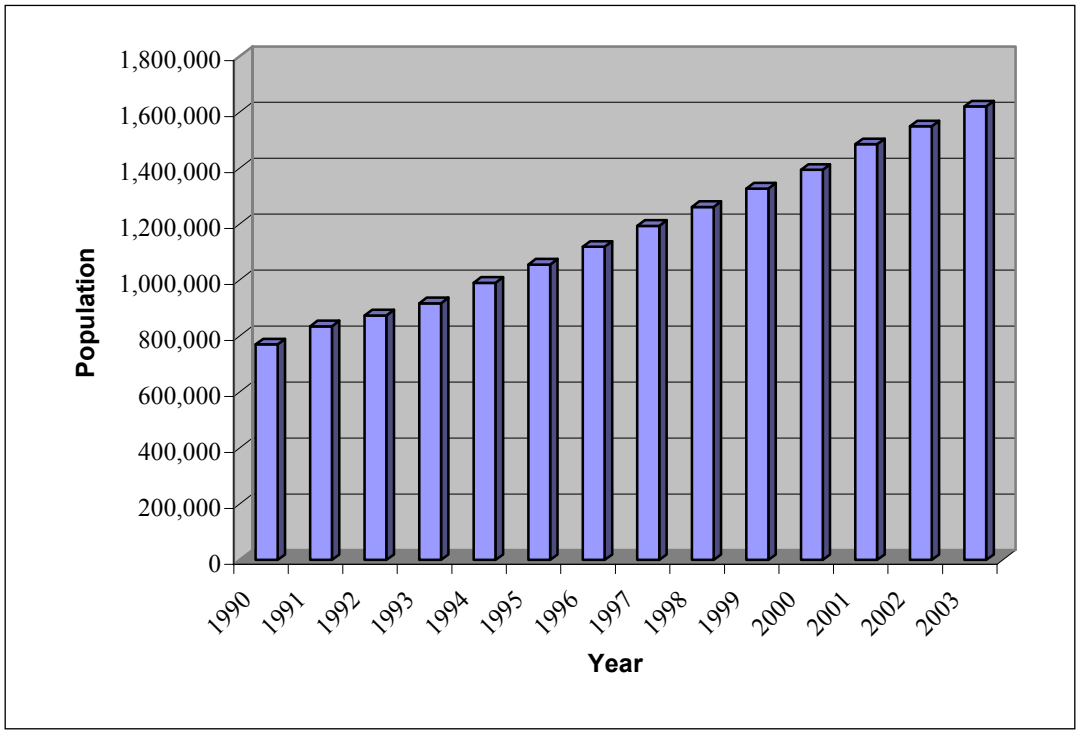

FIGURE 3.12-1
POPULATION GROWTH IN CLARK COUNTY

TABLE 3.12-1
PERSONAL INCOME IN CLARK COUNTY

Year	Personal Income ($1,000)	Year	Personal Income ($1,000)
1990	15,164,437	1997	30,837,864
1991	16,627,318	1998	34,376,173
1992	18,548,145	1999	36,998,190
1993	20,229,300	2000	40,272,340
1994	22,679,951	2001	42,214,406
1995	25,169,866	2002	44,572,356
1996	27,991,984	2003	Data unavailable

Source: BEA 2002a

TABLE 3.12-2
EMPLOYEES BY INDUSTRY IN CLARK COUNTY

Industry	1990	2002	Percent Change
Agriculture, Forestry, Other	3,915	289	-93%
Mining	832	1,256	51%
Construction	40,525	79,061	95%
Manufacturing	11,711	22,695	94%
Transportation/Public Utilities	21,095	31,873	51%
Wholesale Trade	14,360	23,376	63%
Retail Trade	72,492	95,243	31%
Finance, Insurance and Real Estate	32,451	106,239	227%
Services (includes Hotel/Gaming)	210,796	444,509	211%
Government	50,783	85,978	69%
Total	458,960	890,519	94%

Source: BEA 2002b

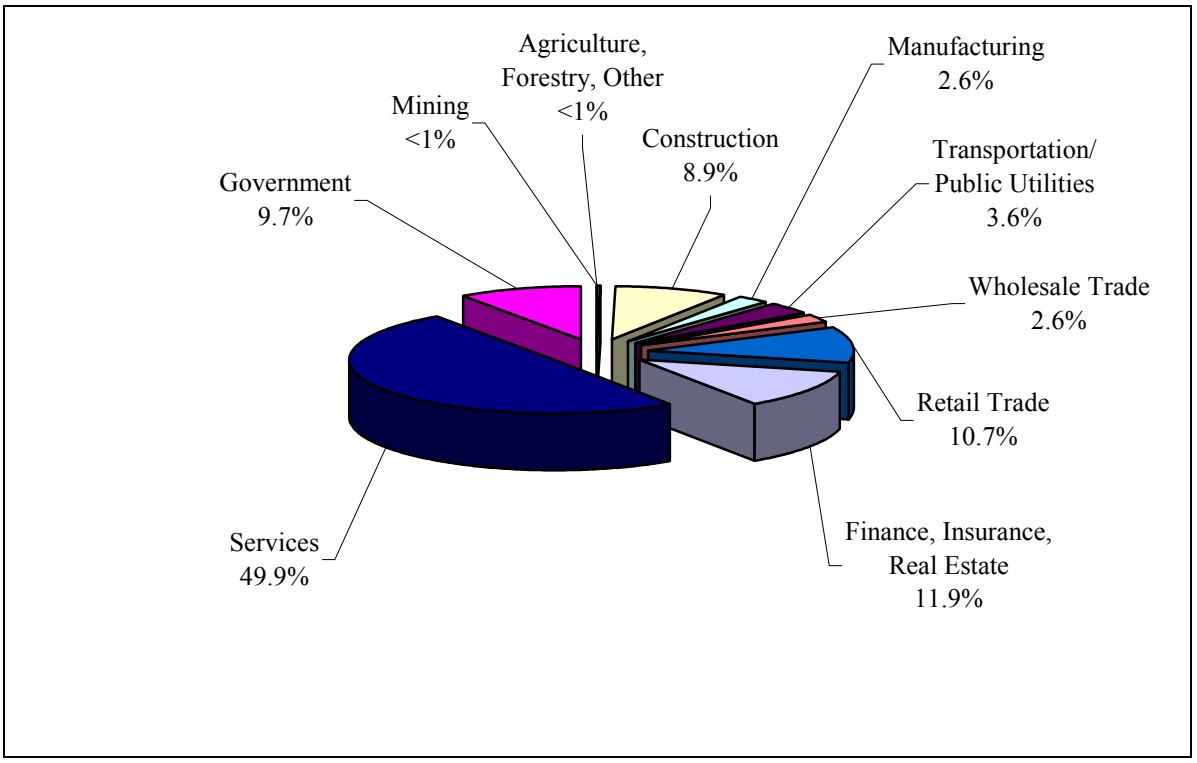

FIGURE 3.12-2
EMPLOYMENT BY INDUSTRY IN CLARK COUNTY, 2002

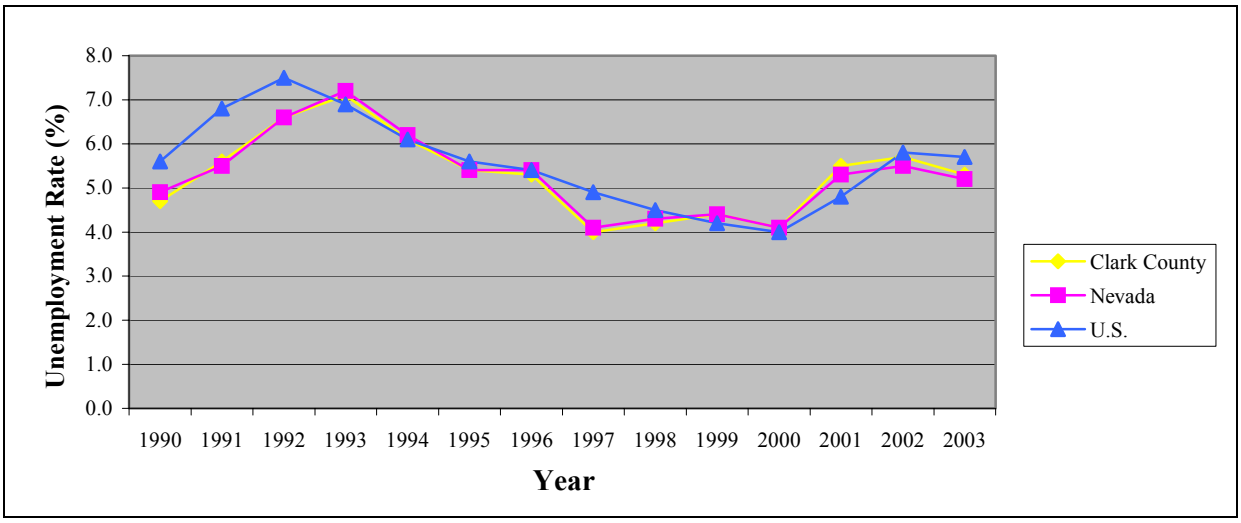

FIGURE 3.12-3
COMPARISON OF UNEMPLOYMENT RATES

TABLE 3.12-3
EARNINGS BY INDUSTRY IN CLARK COUNTY

Industry	1990 ($1,000)	Percent of Total	2002 ($1,000)	Percent of Total	Percent Change 1990-2002
Agriculture, Forestry, Other	65,163	<1%	4,131	<1%	-94%
Mining	11,726	<1%	46,174	<1%	294%
Construction	1,401,817	13%	4,038,243	11%	188%
Manufacturing	357,842	3%	1,101,393	3%	208%
Transportation/Public Utilities	713,699	7%	1,366,685	4%	91%
Wholesale Trade	469,277	4%	1,283,363	4%	173%
Retail Trade	1,222,319	1%	2,750,867	8%	125%
Finance, Insurance and Real Estate	509,672	5%	3,965,281	11%	678%
Services (includes Hotel/Gaming)	5,434,079	50%	15,192,054	45%	180%
Government	1,831,088	17%	4,713,624	13%	157%
Total	10,916,682	100%	33,306,815	100%	205%

Source: BEA 2004

shown in Figure 3.12-3. The rates in Clark County ranged from a high of 7.1 percent in 1993 to a low of 4.0 percent in 1997. Generally, unemployment in Clark County and Nevada was lower than or equal to the national average unemployment rate in 10 out of the past 14 years.

3.12.2.2Earnings

Earnings represent the total annual payroll for industries in Clark County. As shown in Table 3.12-3, total earnings in Clark County tripled between 1990 and 2002. The finance, insurance, and real estate industry experienced the greatest percentage increase during this time period, whereas the agriculture and forestry industry showed a significant decrease. The services industry, which includes hotels and gaming, represents approximately half of the total earnings for Clark County. Although the percent of total of all earnings decreased in the services industry, it still showed a significant increase during this time period. The services industry is the single largest tourism generator in Clark County. Approximately 35.5 million people visited the Las Vegas metropolitan area in 2003 and there was

TABLE 3.12-4
RESIDENTIAL BUILDING PERMITS AND CONSTRUCTION COSTS, CLARK COUNTY

Type of Unit	2000		2001		2002		2003	
	# Units	Cost ($1,000)	# Units	Cost ($1,000)	# Units	Cost ($1,000)	# Units	Cost ($1,000)
Single-Family	21,282	2,381,685	21,871	2,575,263	22,148	2,745,747	27,354	3,385,724
Multi-Family	4,942	285,011	7,836	424,501	7,008	463,776	9,378	502,830
Total	26,224	2,666,696	29,707	2,999,764	29,156	3,209,523	28,277	3,888,553

Source: U.S. Census 2003

approximately $7.8 billion in gross gaming revenue generated (UNLV 2003b).

3.12.3 Housing

Housing in Clark County is concentrated in the Las Vegas Valley in the metropolitan areas of the cities of Las Vegas, North Las Vegas, and Henderson and in the unincorporated areas of Clark County surrounding these cities. The cities of Boulder City, Mesquite, and Laughlin provide additional housing within the county, as well as several unincorporated areas located outside the Las Vegas Valley. There were 2,769 new homes purchased in 2004 and an additional 6,251 homes were resold. The median price of a new home in Clark County was $225,813 in March 2004, which is affordable compared to the Los Angeles metro area where a majority of new Las Vegas residents originate. The median resale price for a home in Clark County was $208,500 in March 2004 and the median monthly rent for an apartment was $747 in 2003. (UNLV 2004a).

Table 3.12-4 shows residential housing building permits and construction costs for Clark County from 2000 to 2003. There has been a steady increase in single-family residential construction, and other than a slight decrease in 2002, multi-family unit construction has almost doubled since 2000. The greatest share of new building permits was for single-family homes with the largest number issued in 2003. At a total construction cost of approximately $3.4 billion, the average construction cost for a single-family home in 2003 was $123,774, whereas cost for a multi-family unit averaged $53,600.

3.12.4 BLM Land Sales

Since the enactment of SNPLMA in 1998, the BLM has made public (BLM managed) land within Clark County available to the private sector through public auctions. The BLM has sold approximately 8,200 acres of land to private entities as of June 2004 that has generated approximately $1.4 billion in revenue. The SNPLMA provides for 85 percent of this revenue to be retained by the BLM to acquire environmentally sensitive land in other areas that have value for resource protection and management. Another 10 percent of the land sale revenue is allocated to the Southern Nevada Water Authority (SNWA) and remaining five percent is allocated to the State of Nevada General Education Fund for use by the Clark County Independent School District. As of June 2004 the SNWA has received approximately $141 million and the school district has received approximately $70 million from the BLM lands sales (BLM 2004).

3.12.5 Schools

The Clark County School District is the only one in the county. It was ranked as the sixth largest school district in the U.S. for the school year 2003-04 and as one of the fastest growing districts as well. Enrollment has increased by 50 percent from the 1996-97 school year through the 2003-04 school year. As shown in Figure 3.12-4, enrollment has been growing by approximately five percent per year and is projected to continue at that rate through the 2006-07 school year. A typical year of planning for growth for the school district includes 14,000 new students, 12 to 14 new schools, 2,300 new teachers, 100 new busses, and 560 portable classrooms. For the 2004-05 school

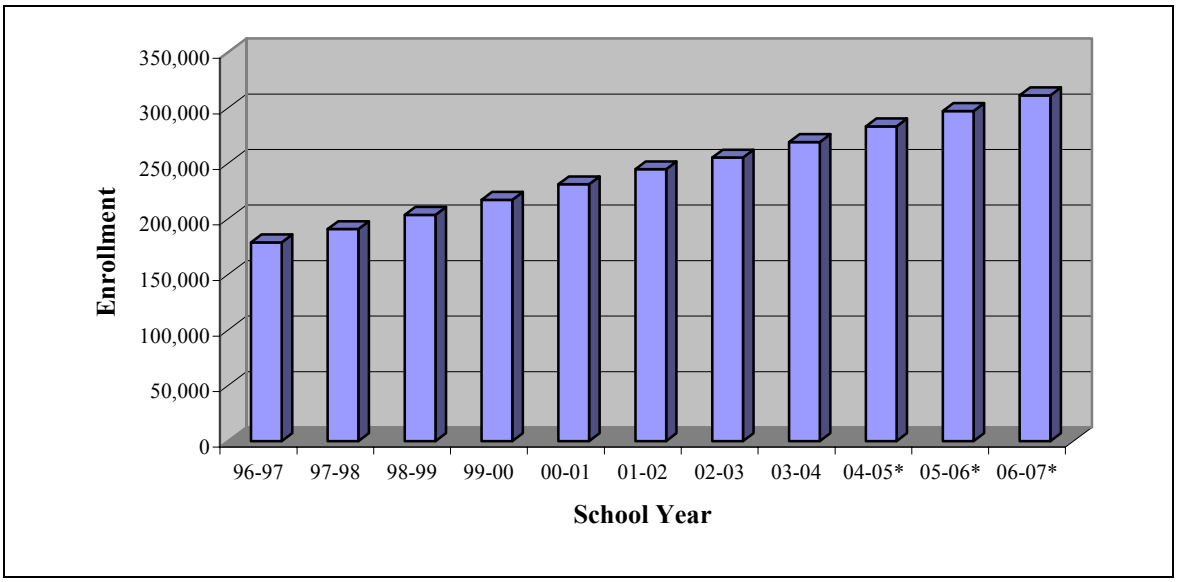

FIGURE 3.12-4
CLARK COUNTY SCHOOL DISTRICT ENROLLMENT

year there are seven new elementary schools, three middle schools, and three high schools scheduled to open (Clark County School District 2004).

Funding for schools is supplied through various federal and state aids, investment income, and taxes. As stated above, the State of Nevada General Education Fund receives five percent of the revenue derived from BLM land auctions under SNPLMA.

Table 3.12-4 shows residential housing building permits and construction costs for Clark County from 2000 to 2003. There has been a steady increase in single-family residential construction, and other than a slight decrease in 2002, multi-family unit construction has almost doubled since 2000. The greatest share of new building permits was for single-family homes with the largest number issued in 2003. At a total construction cost of approximately $3.4 billion, the average construction cost for a single-family home in 2003 was $123,774, whereas cost for a multi-family unit averaged $53,600.

3.12.6 Property Valuation and Taxation

The sales and use tax in Clark County is 7.5 percent which amounts to 6.5 percent of several taxes combined based on Nevada Revised Statutes and 1.0 percent for locally adopted option taxes for transportation and roads, flood control, and infrastructure. Sales tax is charged at retail on the sale of tangible personal property unless exempt by statute and other taxes are levied on gasoline, diesel fuel, motor vehicles, and gross gaming revenues. There are no corporate or personal income taxes in Nevada. (Nevada Development Authority 2003).

Nevada's constitutional limit on property tax is $5 per $100 of assessed valuation while the statutory limit is $3.64 per $100. Property is assessed at 35 percent of current appraised value. Property values are updated annually and the Clark County Assessor is required by Nevada law to physically reappraise all property at least once every five years. As of December 2003, the net assessed value of real property in the county was over $45.6 billion which generated an estimated $1.4 billion in tax dollars.

3.12.7 Utilities

Public and private utilities in the Las Vegas Valley provide electricity, natural gas, water, and wastewater to consumers.

3.12.7.1 Electricity

Nevada Power, a subsidiary of Sierra Pacific Resources, provided electrical service to 625,627 homes and 83,617 commercial or industrial facilities in 2003. Electricity is supplied by four generating plants in Southern Nevada and by purchasing power from Hoover Dam and elsewhere (Nevada Power 2003). The company has developed a resource plan which projects use from 2003 through 2022. Projected power use is expected to rise from a daily peak of 4,526 megawatts (MW) in 2002 to a daily peak of 7,449 MW in 2022 (Nevada Power 2004).

3.12.7.2 Water

The Southern Nevada Water Authority operates the Southern Nevada Water System, which works to secure water resources for the Las Vegas Valley. Southern Nevada gets about 88 percent of its water from the Colorado River (Lake Mead) and the other 12 percent comes from groundwater that is pumped out through wells (SNWA 2004). The Las Vegas Valley Water District (LVVWD) provides water for residents in the City of Las Vegas and the unincorporated areas of the valley, whereas the cities of North Las Vegas and Henderson provide for their own residents. The LVVWD and the cities are members of the SNWA. The SNWA has developed a Water Resource Plan that addresses projected growth and water needs for near-term through 2016, and long-term from 2017 to 2050. The Las Vegas Valley is under drought watering restrictions because of lowering water levels in Lake Mead.

3.12.7.3 Natural Gas

Southwest Gas Corporation provides natural gas for the Las Vegas Valley, as well as parts of Arizona and California. Service has grown from providing natural gas to approximately 1.2 million customers in 1999 to 1.53 million in 2003, of which 542,000 are located in Southern Nevada. Southwest Gas added 31,000 new customers in Southern Nevada in 2003. Future planning for service includes a four to five percent increase per year in customers (Southwest Gas 2004).

3.12.7.4 Wastewater

Wastewater generated in the Las Vegas Valley is treated and discharged through three wastewater treatment plants operated by the cities of Las Vegas and Henderson and the Clark County Water Reclamation District. These three managing entities comprise the Clean Water Coalition, which was created to address the management of the increasing wastewater flows in the Las Vegas Valley. Approximately 150 million gallons per day (mgd) of highly treated effluent are discharged from the three plants into the Las Vegas Wash, which flows into the Las Vegas Bay of Lake Mead. The Clean Water Coalition is planning for projected increases in wastewater flow and is analyzing the construction and operation of an effluent interceptor pipeline to discharge approximately 400 mgd of treated effluent into different locations in Lake Mead.

3.13 ENVIRONMENTAL JUSTICE

Federal agencies must identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations, as directed by Executive Order 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The purpose of evaluating environmental justice is to determine whether a disproportionate share of adverse impacts would be borne by minority and low-income communities from implementation of a federal action.

3.13.1 Definition

An environmental justice (EJ) population is defined as a population being at least half minority status or at least half low-income status, or the minority or low-income status in the project area is meaningfully greater than the general population. For this project "meaningfully greater" is defined as being at least 10 percentage points higher than the general population. The planning areas within the disposal boundary are compared against the general population of Clark County and the State of Nevada.

A minority population is defined as Black or African American, Hispanic or Latino, Asian, American Indian and Alaskan Native, and Native Hawaiian and other Pacific Islander. Households are classified as below the poverty level (low income) if the total income for a family of four was $17,029 or less for the year 1999 (U.S. Census Bureau 2000d).

3.13.2 Environmental Justice Populations

Individual census block data were not evaluated because the disposal boundary area encompasses most of Las Vegas Valley. The census data used for this project included the incorporated cities and unincorporated planning areas in the Las Vegas Valley shown in Figure 3.13-1. The 2000 Census Bureau data indicate population and income as of the end of 1999. The 2000 source was used because it is the latest year that data are available for the unincorporated planning areas. Census information is not kept separately for Lone Mountain, but its data are included with the City of Las Vegas information.

3.13.2.1 Minority Population

Table 3.13-1 compares the race and ethnic profile for the planning areas with Clark County and State of Nevada data. As shown in the table, there are no planning areas that are at least half minority or at least 10 percentage points higher than the general population of the county or the state. Therefore, no EJ population in regards to minority status was identified within the disposal boundary area.

3.13.2.2 Low Income Population

The population living at or below the poverty level and the median household income in the planning areas are compared with Clark County and the State of Nevada in Table 3.13-1. This population is similar to the general population of the county and the state, and the median household income for each area is also above the low income threshold. Therefore, no EJ population in regards to income status was identified within the disposal boundary area.

The SNPLMA allows the BLM to make lands available for disposal to governmental entities at less than fair market value for affordable housing construction projects. Affordable housing is defined as housing that serves families whose incomes do not exceed 80 percent of the median income for the area. This provision of SNPLMA is discussed further in Section 3.12.

Tribe of Paiute Indians was one of 15 tribes consulted by the BLM in accordance with National Historic Preservation Act procedures to identify properties of traditional cultural importance within the vicinity of the disposal boundary area (see Section 3.6).

3.13.2.3 Native American Tribes

The Census Bureau includes American Indians in the definition of a minority population and Executive Order 12898 instructs federal agencies to include federally recognized Indian Tribes and Native American programs in their EJ analysis. The Las Vegas Paiute Indian Reservation is located within the disposal boundary area and bordered to the north and east by BLM lands that are available for disposal (see Figure 1.3-2). The Las Vegas Tribe of Paiute Indians was one of 15 tribes consulted by the BLM in accordance with National Historic Preservation Act procedures to identify properties of traditional cultural importance within the vicinity of the disposal boundary area (see Section 3.6).

3.14 RANGE MANAGEMENT

Congress enacted the Taylor Grazing Act in 1934 to provide for the orderly use, improvement, and development of public rangelands. The Act allowed the establishment of grazing allotments and the issuance of permits to graze livestock. The Ephemeral Range Rule of 1968 designated grazing allotments in Clark County as ephemeral rangelands. An annual application by a qualified licensee or permittee is not required unless grazing use is desired. Whenever forage exists or climatic conditions indicate the probability of an ephemeral forage crop, livestock grazing may be authorized upon application on a year to year ba-

sis pursuant to any management requirements for the allotment.

3.14.1 Livestock Grazing

The Hidden Valley grazing allotment includes 59,711 acres of BLM land generally located south of Las Vegas, east of Interstate 15, west of the North McCullough mountain range, and north of Jean, Nevada. The allotment is categorized as "I", having the highest need and priority for intensive management to improve the range condition.

The management direction for livestock grazing in the 1998 Las Vegas RMP was to close all land disposal areas to livestock grazing. This management direction (LG-1-g) included that portion of the Hidden Valley allotment within the Las Vegas Valley disposal area as identified in the RMP. The disposal boundary area overlaps the northern end of the allotment as shown in Figure 3.14-1. Approximately 3,000 acres of BLM land available for disposal are in the Hidden Valley allotment.

The operator/permittee has had a grazing permit for the Hidden Valley allotment since May 1975 but has not applied every year for grazing use on the lands proposed for disposal. The permittee has not made any permanent improvements to the range, such as fences, spring developments, wells, pipelines, or troughs on the lands identified for disposal.

Public lands identified for disposal shall not be sold until the permittee is given two years prior notification that their grazing permit may be cancelled or modified, unless the permittee unconditionally waives the notification (43 CFR §2711.1-3). The permittee was notified in October 2003 that the BLM intended to sell the lands within the disposal boundary area that overlap the northern end of the Hidden Valley allotment. The permittee communicated that he was not opposed to the disposal of these lands. There would be no reduction in Animal Unit Months and no cancellation of current use as a result of redefining the allotment boundary to coincide with the land disposal boundary defined by SNPLMA and the Clark County Act.

3.14.2 Wild Horses and Burros

The Wild Free-Roaming Horse and Burro Act of 1971 (Public Law 92-195) authorized the BLM to protect and manage wild horses and burros on public lands. Herd Management Areas (HMAs) have been established for the maintenance of wild horse and burro herds. There are eight HMAs throughout the Las Vegas Field Office boundary, which includes Clark County and part of Nye County. There are no wild horse and burro herds or HMAs within the disposal boundary area.

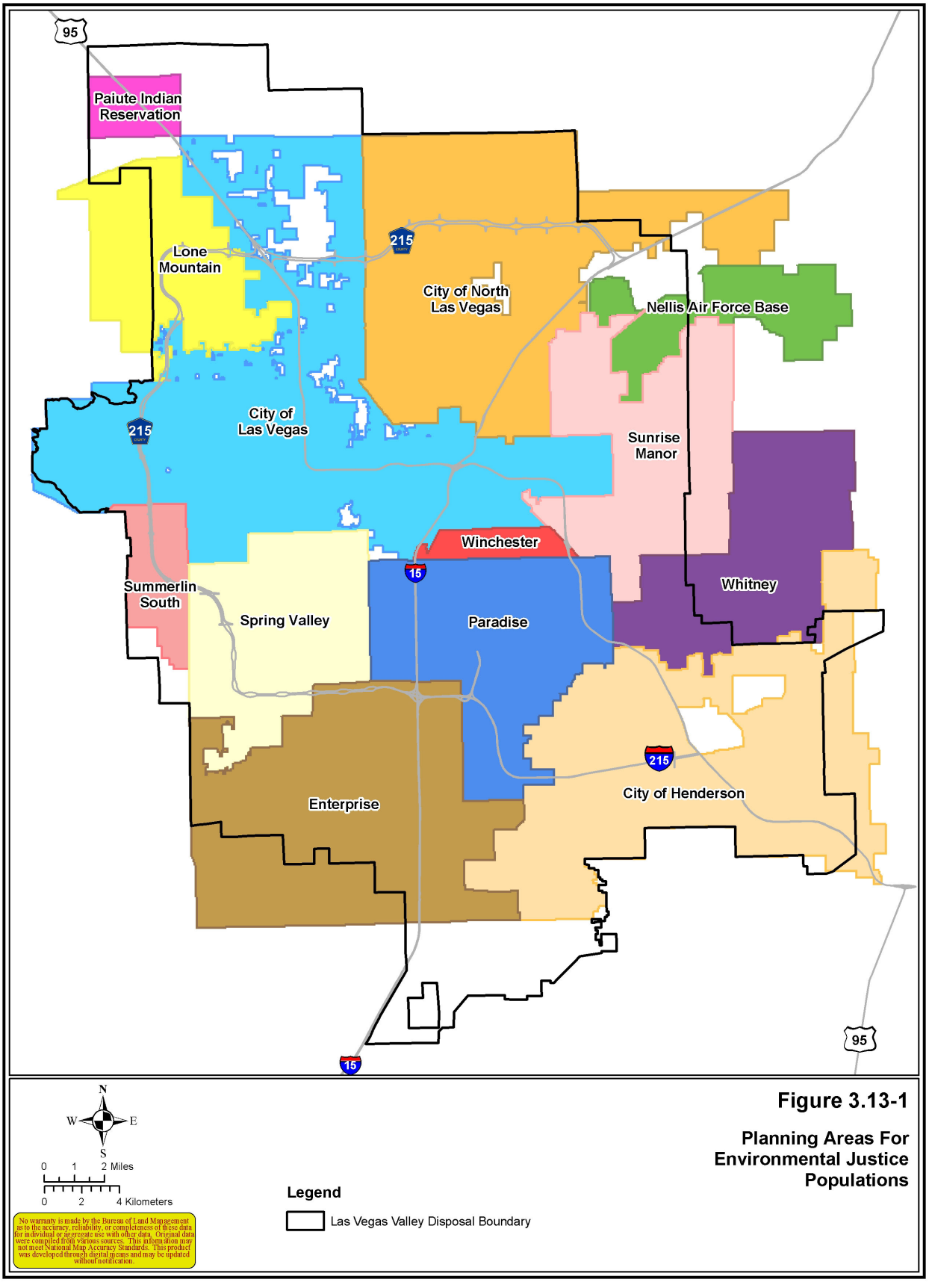

Figure 3.13-1

Planning Areas For Environmental Justice Populations

TABLE 3.13-1
MINORITY AND INCOME CHARACTERISTICS

Planning Area	Total Population[1]	White	Black	Hispanic	Other Race[2]	Below Poverty[3]	Median Income
Las Vegas	478,868	334,914	49,071	113,237	26,855	56,053	$44,069
North Las Vegas	115,489	64,728	21,791	43,503	5,542	16,763	$46,057
Henderson	176,048	149,082	6,889	18,614	8,712	9,774	$55,949
Enterprise	14,437	11,825	470	1,693	991	1,238	$50,667
Las Vegas Colony[4]	107	5	0	4	90	31	$29,861
Nellis AFB	8,896	6,060	1,316	1,066	485	932	$33,118
Paradise	185,832	134,470	12,130	43,733	15,089	21,749	$39,376
Spring Valley	117,649	85,090	6,295	16,106	13,890	7,840	$48,563
Summerlin South	3,672	2,797	213	255	475	118	$64,784
Sunrise Manor	155,683	102,543	19,361	40,231	10,473	19,658	$41,066
Whitney	17,731	12,655	1,312	4,794	900	1,716	$36,536
Winchester	26,802	19,220	1,570	7,674	2,103	3,716	$32,251
Total	1,301,214	923,389	496,933			139,588	
Percent of Total Population[1]		71%	38%			11%	
Clark County	1,375,765	986,202	513,124			145,855	$46,616
Percent of Total Population[1]		72%	37%			11%	
State of Nevada	1,998,257	1,503,083	649,441			205,685	$44,581
Percent of Total Population[1]		75%	33%			10%	

[1] Does not equal total population by race and ethnicity or 100% because of census reporting by individuals.
[2] Other race includes American Indian, Asian, and Pacific Islander.
[3] Population for whom poverty status is determined.
[4] Las Vegas Paiute Indian Reservation.
Source: U.S. Census Bureau 2000a, 2000b, 2000c

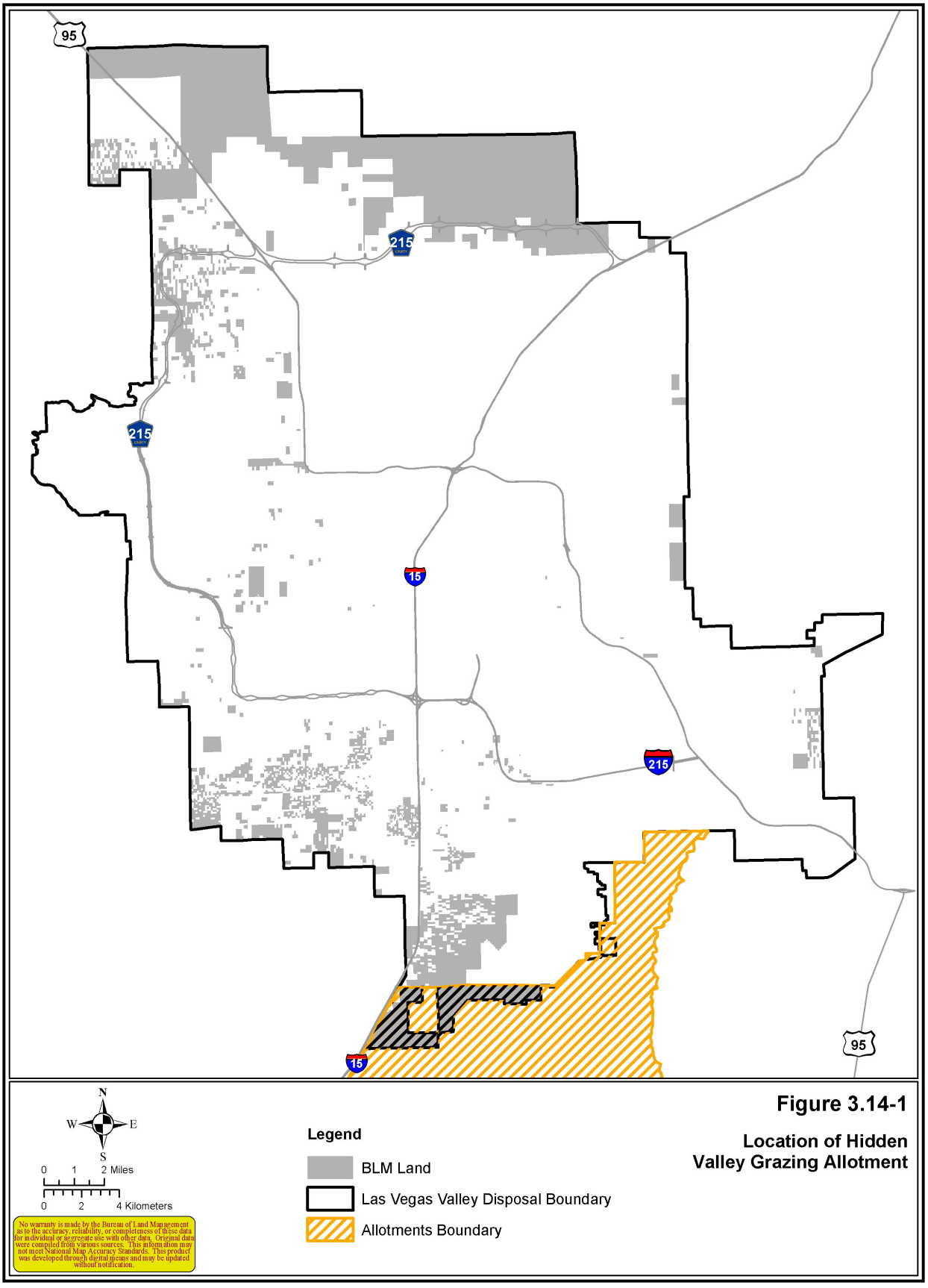

Figure 3.14-1

Location of Hidden Valley Grazing Allotment